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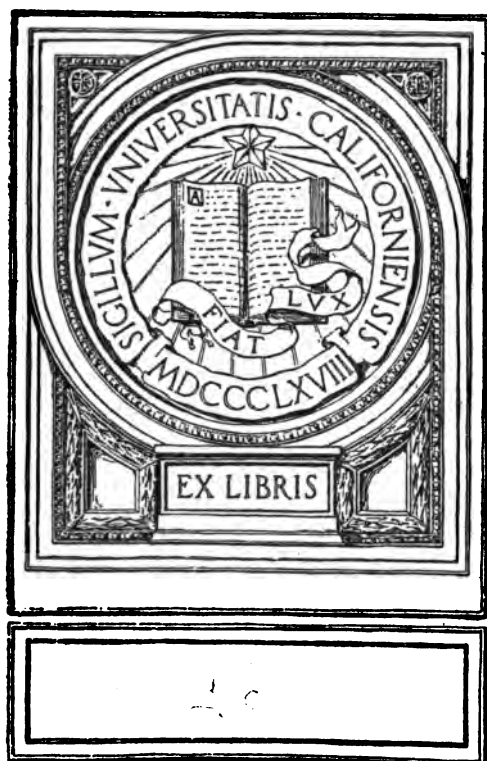
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CANADA'S FUTURE



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CANADA'S

WHEAT OFF

1911

A Symposium



YANCOCK & CO. LTD. OF NEW YORK
THE DOMINION OF CANADA

FIELD-MARSHAL THE ROYAL HIGHNESS
THE DUKE OF CONNAUGHT AND STRATHMORE
GOVERNOR-GENERAL OF CANADA

(Printed and Published by the Government)

FIELD-MARSHAL HIS ROYAL HIGHNESS
THE DUKE OF CONNAUGHT AND STRATHEARN
GOVERNOR-GENERAL OF CANADA

(From the picture by Notman)

CANADA'S FUTURE

WHAT SHE OFFERS AFTER
THE WAR

A Symposium of Official Opinion

Edited By
E. A. VICTOR



TORONTO: THE MACMILLAN COMPANY
OF CANADA, LTD., AT ST. MARTIN'S HOUSE
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THE
UNIVERSITY OF
TORONTO

To

Field-Marshal His Royal Highness
THE DUKE OF CONNAUGHT & STRATHEARN,
K.G., K.T., K.P., G.M.B., G.C.S.I., G.C.M.G.,
G.C.I.E., G.C.V.O., P.C.
Governor-General and Commander-in-Chief

**THIS BOOK IS, BY SPECIAL PERMISSION,
RESPECTFULLY DEDICATED**

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INTRODUCTION

When, some years ago, I first heard the phrase, "The Twentieth Century is Canada's," it struck me as being excessive. Since then I have spent four years in the Dominion; years full of opportunities to study her truly wonderful resources, and the conclusion is borne in upon me that the man who coined that phrase was a prophetic thinker. If the apothegm was true before the war, it should be doubly so after.

Africa is exceptionally rich in gold and diamonds; South America and Manchuria in copper; the United States in oil, coal, and iron-ore, while England has been described as "The Coal-cellar of the World," but in no country known to civilization has Nature been so bountiful as to Canada, that tract of land measuring nearly three-and-three-quarter million square miles—about a third of the British Empire.

One may well talk of her "broad acres," when there are nearly two billion three hundred and eighty seven millions of them! Literally millions of acres of the most perfect soil are simply waiting for the plough. Her enormous harvests can easily be trebled. In fact, with her uninterrupted "fat years," Canada already bids fair to become a modern Egypt, to which the world will turn for bread.

It is no exaggeration to say that the vast mineral wealth of the country has scarcely been scratched; that wealth far beyond the dreams of avarice is just lying waiting to be developed.

My statement as to Canada's potential greatness and her practically illimitable natural resources—which open up opportunities in almost every phase of life—is no parrot cry; I speak of that which I know. That knowledge, too, is backed by experience accumulated in Great Britain, France, Belgium, Portugal, Africa, Germany, and Canada.

The technical departments of the Canadian Governments have done—and are continuously doing—wonders, in the

fields of Geological, Mineralogical, and Agricultural research, the benefits of which are available for the asking, to whomsoever is interested.

The population of England and Wales exceeds five hundred people per square mile; at one-quarter of that rate Canada would accommodate half a billion. Her most sanguine expectations do not exceed a quarter of *that* number, so that one can always count on ample breathing space and to spare. With her vast area—huge tracts of which being still unsurveyed—her present population does not exceed an average of two persons per section or square mile.

This fact will doubtless appeal strongly to those of this and the next generation whose inclinations lead them to an open-air life, not the least of the many benefits of which is the close proximity to nature.

“Jim” Cornwall, the well-known fur-trader, who has spent many years away up north in the region of the Mackenzie River basin, once told me that sleeping on the ground wrapped in his rug—with nothing between him and the high heavens, without a human being within sight or hearing—he felt as though he could reach out and shake hands with God.

The man who owns his farm, the “vested righter” who reaps the fruits of his own brain and brawn, makes for individual and national wealth. The citizen makes the nation, and from the national point of view this excerpt from Dickens’ philosophy is worthy of record:—“In love of home, the love of country has its rise, and who are the truer patriots or the best in time of need—those who venerate the land, *owning* its wood, and stream, and earth, and all that they produce, or those who love their country, boasting not a foot of ground in all its wide domain?”

For many years “emigrating” from Great Britain and Ireland largely meant settling in the United States. There has been also, to some extent, emigration to Canada, to Australia, to Africa, and elsewhere, but without any other qualification, “emigrating” has usually held but one meaning.

There are many reasons why those of British birth—the best colonizers in the world—who desire to pitch their tents in another land, should choose some other part of the British

Empire rather than a country which, though speaking the same language as themselves, gets thinner and thinner in British blood as it receives the larger admixture from southern and eastern Europe.

Especially should Canada appeal to the prospective British settler. The climate is more nearly his own; the people are largely of his own race; its institutions are nearly, if not exactly, like his own; and coming to Canada he can feel that, with his kith and kin at home, he is still a proud unit of the same glorious Empire, living under the same grand old Flag, the same King.

To the man, or woman, blessed with brains, self-reliance, and a little money, Canada really offers almost unlimited opportunities to "make good." The lot of the worker, too—if he or she is a worker—is, I verily believe better and in the majority of cases far better than that of their compeers in any other country. The workers, of course, will not come until the war is happily over and the country is ready for them, but when the government gives the word I can foresee them coming in shoals.

During my journeyings and residence in Canada I have had the pleasurable privilege of meeting many of her most distinguished sons, and adopted sons who have come from other lands and made the Dominion their home, including leaders of thought and action in the State, the Church, the Learned Professions, and Commerce. It is to divers of these to whom I am indebted for the interesting and valuable contributions which will be found in the following pages.

This work is not given to the world as "a book of praise," but rather as a collection of thoughtful and judicial pronouncements by representative men whose life-work has helped to make Canada what she is, each eminent in his own sphere and speaking with the authority of experience.

Nous avons donné à penser.

That the result will prove valuable to many—and of genuine interest to most—of the "all sorts and conditions of men" into whose hands the book finds its way, is my sincere hope.

Bishop Court,
Montreal.

E. A. V.

CANADA'S OUTLOOK

BY THE HON. SIR GEORGE E. FOSTER, K.C.M.G., LL.D., M.P.*

The great contest now being waged by the Empire will have its inevitable effect upon Canada. It will add another to the ties which already bind her to the Empire,—the tie of common sacrifice for its ideals and its integrity. This will result in an added responsibility for, and co-operation in, the affairs of the Empire in times of peace. What political or constitutional trend this will assume must be left to the future, but its decision cannot long be delayed. As to Canada herself, the serious side and the spiritual side of life has already been emphasized, and must with each succeeding day's events be much more deeply emphasized. The effect will be individual, collective, and national, and cannot but result in strengthening the moral fibre and the ruling ideals of the nation.

The existing burdens and disabilities, financial and business, entailed by the war, though extremely heavy are cheerfully borne, and in no way dampen the courage and optimism of the people. Our natural resources are so great, and our confidence in the future so well based and general, that we bend our back to the burden and our minds to the plans for overcoming the difficulties, with the cheerfulness of a combatant who enjoys present struggle in the sure hope of coming victory.

Canada has over-borrowed, over-built and over-speculated, but is thoroughly sound in wind and limb, and has learned much from past experience. Her progress hereafter, which will be better based, and on saner principles and improved methods, will undoubtedly be very marked.

* George Eulas Foster was born 1847; Douglas gold medallist, Univ. of N.B.; D.C.L. 1885; LL.D. 1894; entered Parliament as an Ind. Conservative 1882; Minister of Marine and Fisheries 1885 in Sir John A. Macdonald's Govt.; Minister of Finance 1888 in same Ministry; continued Finance Minister in subsequent administrations until 1896. Appointed Minister of Trade and Commerce in the Borden Cabinet, 1911. Was knighted by King George, 1914. "A man of many parts, he has the reputation of being a lucid and pleasing speaker and one of the ablest debaters in Parliament."

CANADA'S CENTURY

By N. W. ROWELL, K.C., M.P.P.*

In 1917 we celebrate the fiftieth anniversary of Canadian Confederation. In 1867, the movement was looked upon by some of the political leaders in Great Britain as a step towards Canadian independence. Canadian statesmen, who better understood the thought and temper of the Canadian people, considered Confederation an essential step towards true national unity and development, and believed that it would strengthen, rather than weaken, the ties which bound Canada to the Motherland. Experience has more than justified their faith and courage.

The original area of the four provinces which formed Confederation was only 662,148 square miles. By the bringing in of the other provinces, and the purchase of the North-West Territories, the Parliament of Canada now exercises jurisdiction over a population of nearly 8,000,000 people, and an area of 3,729,665 square miles—about one-third of the total area of the British Empire, with her population of over 400,000,000. Canada is almost as large as the continent of Europe, and is larger than the United States, including Alaska, the Philippines, Porto Rico, and other possessions. The population of the United States and her possessions exceeds 100,000,000.

What is our situation, and what the habitable area? Edinburgh is 800 miles, and Petrograd 1,100 miles north of Toronto. Dawson City, the most northerly city of Canada, is 1,500 miles north of Toronto. The warm currents of the Pacific moderate the climate of western Canada, just as the Gulf Stream moderates the climate of western Europe. We have great varieties of climate, but nowhere is the prevailing

* Newton Wesley Rowell: born 1867; called to the Bar, 1891; K.C., 1901; Benchet of the Law Society, 1910; a member of Senate, Toronto University, and a regent, Victoria University. Elected to the Ontario Legislature, and appointed leader of the Liberal Opposition, 1911.

temperature so warm as to be enervating, and everywhere it is such as should help breed a strong, aggressive, and conquering race. It is not possible to foretell, or even hazard, a judicious guess as to the limits of the future development of our agricultural, mineral, and manufacturing industries. That they will surpass the expectations of even the most sanguine goes without saying. Certain it is that the extent of the territory open for settlement, and the richness and variety of the resources, ensure that in the very near future these territories must be the home of millions of people.

The tide of immigration which set in towards Canada at the opening of the present century soon developed an annual volume more than four times as great in proportion to our population as the immigration to the United States in any year of her history. Almost all European nations have contributed of their citizens to make up this large and increasing number of immigrants. One of Canada's greatest tasks during this century will be to mould these diverse nationalities into a true Canadian nationality, so that they may be a source of strength rather than of weakness, that they may possess our ideals and share our aspirations, and that we may as one people devote our energies to the performance of our national and social obligations.

In the task of conquering the forces of nature, and subduing half a continent, a sturdy individualism has been developed, and Canada to-day is possibly the most individualistic community under the British flag. But with the rapid increase in her population, and particularly in the growth of her cities, social influences and social forces are rapidly changing the current of the nation's thought and life. Canadians are becoming less individualistic; the social conscience is asserting itself; and legislation to secure social justice for the masses of the people will occupy a large place in the legislative programmes of the future. Such legislation is one of the pressing needs of Canada.

When the war—which has put an end to immigration for the time being—is over, the tide will undoubtedly again set in towards the shores of Canada. Many of the men of the United Kingdom, and the other countries, who are now fighting in the allied cause, and have come to understand and appreciate

open air life, will be disinclined, when peace is declared, to return to sedentary occupations. They may turn their faces towards Canada in great numbers, to establish homes where they may enjoy the liberty they have fought so nobly to preserve, and still live under the protection of the flag which they offered their lives to protect. The patience, persistence, adaptability, and courage which they have displayed in the trench warfare, are the characteristics most essential for life in Canada at the present time. We will give to all these men a most cordial welcome. We hope they will come and share with us the liberty and the free institutions which they have helped to preserve, and that they will unite with us in the endeavour to make this the century of Canada's opportunity.

With our Canadians serving to-day in various branches of His Majesty's forces in Great Britain, France, Saloniki, and Egypt, sharing with the other nations of our commonwealth, and the allies, the brunt of this great struggle, we cannot but recognize that Canada has swung out into the full current of the world's life, and in that larger field to which destiny has called her, she is bound to play an increasingly important part. We, in Canada, may shrink from, or welcome, this future, but we cannot escape it. We cannot fall back into the old place again. The oceans which were once barriers to separate us, are now highways to unite us. While this war has shown us the great difference in national ideals, the universality of its effect upon all the peoples of the world has demonstrated that no nation can live unto itself, and that in the larger life of the world Canada must play her part.

The influence of Canada in the counsels of the Empire must steadily increase. That influence will be on the side of democracy, free government, and human liberty. With such an area open to settlement, with British and democratic institutions firmly planted, with a strong and virile population, loving liberty and hating oppression, with an ever increasing tide of immigration to our shores, Canada, if but equal to her opportunities, can indeed make this *her century*.

CANADA'S CORNUCOPIA

THE GRAIN INDUSTRY

BY JAMES CARRUTHERS*

I do not propose to dilate on the marvellous development of Canada during the past five-and-twenty years, except in so far as it concerns her grain industry.

In 1881 the total yield of wheat from all Canada amounted to 32,350,000 bushels, the yield of barley to 16,800,000 bushels, and oats to 70,500,000 bushels, making a grand total of 119,650,000 bushels, to which total the North-West contributed only 1,200,000 bushels of wheat.

In 1913, to a production of 700,000,000 bushels, wheat contributed 231,000,000, oats 404,000,000, barley 48,000,000, and flax 17,000,000 bushels.

Twenty years ago the bulk of the grain grown in Canada was raised in the Province of Ontario, but during recent years the North-West Provinces have been the heaviest producers.

At the present time less than ten per cent. of the arable land in Manitoba, Saskatchewan, and Alberta, is under cultivation.

Government returns, 1913, show that only 16,150,000 acres in these three provinces have been touched by the plough, while it is officially estimated that over 272,000,000 acres are still available for agricultural purposes.

In 1901 there were in the Dominion at 219 points, technically termed "stations", 426 grain elevators, having a holding capacity of 18,329,352 bushels. In 1915 the numbers had risen to 2,813 elevators at 1,247 stations, the holding capacity aggregating 168,624,000 bushels.

*James Carruthers: born, 1853; President of James Carruthers & Co., Ltd., Montreal, Winnipeg, and New York; one of the principal grain authorities on the American continent; Past-President, Montreal Corn Exchange; President, Canada Steamship Lines; Director of several steamship and insurance companies, banks, and other commercial concerns; one of the founders of the Montreal Jockey Club.

The yield in the three prairie provinces for the years 1900, 1905, 1912, and 1915 was as follows:—

	1900 Bushels	1905 Bushels	1912 Bushels	1915 Bushels
Wheat	23,000,000	82,000,000	190,000,000	265,000,000
Oats	17,000,000	68,000,000	220,000,000	300,000,000
Barley	3,000,000	11,000,000	28,000,000	40,000,000
Total ...	43,000,000	161,000,000	438,000,000	605,000,000

Remembering that only ten per cent. of the land is under cultivation, these figures are eloquent of the capacity of the country, when it is fully developed.

Government returns give the average yield per acre for the year 1915 as follows:—wheat, 20 bushels; oats, 45 bushels; and barley, 34 bushels.

I do not consider it extravagant to estimate that by, or about, the year 1920 our three North-Western provinces should produce 500,000,000 bushels of wheat, and so justify the claim to the title of the Empire's Granary.

The United Kingdom requires to import about 250,000,000 bushels of wheat yearly. Canada should, therefore, within a very short time, be able to supply all the breadstuffs the Mother Country requires and, in addition, make good any shortage that our neighbours to the south may have. The celebrated English authority, Broomhall, places the world's wheat crops for 1912 at 3,730,000,000 bushels, crediting the United States and Russia with 720,000,000 bushels each; India 368,000,000; France 335,000,000; Canada 205,000,000; and the Argentine with 200,000,000 bushels. Canada to-day occupies fifth place in the wheat-producing countries of the world, and it looks as though, within a very few years, she will rise to third, or even to second place.

The wheat grown in the Canadian North-West is admitted by millers to be the best quality in the world. It brings the highest prices in the leading wheat markets of Europe. There are very few millers in the United Kingdom grinding imported wheat to-day, who do not use our Canadian wheat. Owing to the fact that wheat can be so easily raised in the Canadian North-West, the majority of the farmers there have grown nothing else; but as it is possible that through climatic conditions, or even by a hailstorm, the entire wheat crop of a

farm might be seriously damaged, or even destroyed, it is better for the farmer to turn his thoughts to mixed farming. The governments, and other competent authorities, are doing everything possible to induce the farming community to go more into mixed farming and stock-raising. The agriculturist would undoubtedly be much better off, if he would not put all his eggs into one basket.

The North-West is pre-eminently suited for the breeding and feeding of all classes of stock, being unexcelled in healthfulness of climate, good water, and a soil capable of producing nourishing foods in abundance; while the facilities for transportation are keeping pace with the general progress of the country, and so placing the producer within easy reach of the world's markets. There is also a large, and continually increasing, home market. The fertility of the soil will undoubtedly be wonderfully increased by mixed farming, and, therefore, it is hoped that within a few years our North-Western farmers will take to it more extensively. The governments and the Canadian Pacific Railway Company are also working to interest the farmers in scientific agriculture. Nineteen experimental farms—having a total area of 8,935 acres—established by the Dominion Government, are already in operation throughout the country, in addition to similar institutions started by provincial governments.

The Canadian Pacific Railway has recently inaugurated an admirable system of agricultural instruction in connection with the running of what are termed "Better Farming Specials", through the different provinces. These trains exhibit samples of grain in different parts of the country. Literature of every description, showing the kinds of crops that are best suited for the different classes of land, and setting forth the most practical methods of raising grain and live stock is distributed; in fact, everything pertaining to the improvement and advancement of farming is demonstrated and explained by capable instructors in the employ of the railway company. It is gratifying to know that the efforts being made in this direction are meeting with conspicuous success, and there can be no doubt that within a very short time good results will follow.

The Dominion Government is thoroughly alive to the fact

that Manitoba hard spring wheat is now a recognized grade with all European millers, and it has made stringent regulations in the inspection department as to grading, so that European buyers can absolutely rely on the thoroughness of the inspection. It is a fact, well known to the world's grain buyers, that this government inspection is recognized and accepted without hesitation. In 1912, three able and experienced men were appointed to constitute a Board of Grain Commissioners, whose duties include the investigation of all important matters relating to inspection, storage, handling, and conveyance of grain. The board exercises wide powers, and has already accomplished good results, including the bringing about of a more correct and honest system of inspection at terminal elevators. Legislation by the Dominion Government, in reference to these matters, is largely to protect the farmer; to see that he receives fair and honest treatment, and that he is thereby encouraged to greater and better efforts.

With the enormous expansion and development now proceeding in Manitoba, Saskatchewan, Alberta, and British Columbia, the yields of all kinds of grain in the agricultural belts are increasing yearly by leaps and bounds. The transportation problem is one that will tax the government and railways perhaps for the next ten years. They fully realize the position, and are making every effort, with a considerable measure of success, to meet the situation all over the country. Sixty years ago, the total railway mileage in Canada was only 159 miles; in 1871 it had reached 2,700; in 1891, 13,800, while in 1916 it is over 30,000 miles. At the present time the four great Canadian railways, *viz.*, the Canadian Pacific, Grand Trunk, Canadian Northern, and the Government Intercolonial, are showing great energy and enterprise in the construction of new lines, and in the betterment of their existing ones. The enormous scale upon which these railways are proceeding is indicated by the Canadian Pacific expenditure, during the year 1913, of fifty millions of dollars west of the Great Lakes, in equipment, extensions, double-tracking, and other improvements.

The Panama Canal opens up another route for the transportation of grain from western Canada to Europe, and it is

anticipated, by those in a position to judge, that a considerable share of this traffic will go *via* Canadian ports on the Pacific ocean and the canal. For years, shipments of wheat have been made from California and Washington Territory to the United Kingdom and the Continent, but it has been necessary to ship this grain in sacks on account of the extreme heat in passing through the tropics, and also to meet the requirements of the underwriters. In all probability, Canadian wheat going *via* the Panama Canal will also have to be shipped in sacks, but the saving in freight by an all-water route, in comparison with shipments all-rail, to the Atlantic seaboard, and thence by ocean vessel, will undoubtedly be considerable. The general opinion is, however, that the bulk of the grain of the Canadian North-West will always be freighted by our great natural highway of lake and river navigation, *via* the St. Lawrence, extending, as it does, from the head of the Great Lakes to tide-water at Montreal and Quebec. Of course, this traffic is restricted to eight months in the year, the navigation season extending only from April to December. Both the Canadian and United States Governments have spent, and are spending, large sums in the improvement of navigation between Lake Superior and Lake Huron. The present locks at the Soo Canal are 1,000 feet long, accommodating boats of 10,000 tons.

The Dominion Government is now constructing a new Welland Canal, connecting Lake Erie and Lake Ontario. The old canal had a depth of only fourteen feet of water, and the new one will have a depth of twenty-five feet, so that when this new canal is completed, large freighters from the Upper Lakes will come through as far as Kingston, Ontario, where the grain will be transhipped into barges, which will bring it through the canals to the port of Montreal. The facilities now afforded on the lakes and rivers for inland navigation are yearly being increased. The government, realizing the great importance of keeping the traffic in Canadian channels, has spent millions on the improvement of the harbour of Montreal, and in the deepening of the channel between that port and the sea.

CANADA'S FUTURE WITHIN THE EMPIRE

BY MAJOR-GENERAL THE HON. SIR SAM HUGHES, K.C.B., M.P.*

Year after year I brought before the House of Commons and advocated a resolution that "The interests of Canada and the British Empire would be best served by a full partnership between Great Britain and her colonies."

That was a political creed which I adopted long ago. The passage of years, and the shock of the greatest war in all history, have shown that I was right, and to-day I have the pleasure of welcoming to my side of the question many who once ridiculed my views. There were people who talked of Canadian independence; the burst of loyalty to the British Empire which has sent some 280,000 men into the ranks of the Canadian Expeditionary Force—and intends increasing that number to half a million if necessary—shows where the affections of Canada are, and shows also that the cold-hearted idea of cutting away from the Motherland has never appealed to our generous-minded young Canadians. To-day Canada is taking her part in the great war in which the British Empire is involved.

How are we to get that full partnership union? My own idea, which I believe is held by the great majority of the people at large, is that the present relation between Great

*Sam Hughes was born in 1853; took honours in English, French, German, and History at Toronto Univ. Entered the 45th Regt. as Lieut. in 1873; rose to Lieut.-Col. commanding the Regiment, in 1897; served in the Fenian Raid, 1870, (medal with clasp); Boer War, 1899-1900, (medal with two clasps). Commanded Mounted Brigade and force into Bechuanaland; was three times mentioned in despatches; Asst. Adjt.-Gen., S.A. Field Forces, 1900; President, Dominion Rifle Ass'n.; F.R.C.I., 1911. Has sat in House of Commons since 1891; became Minister of Militia and Defence in the Borden Cabinet, 1911. Promoted Major-General, 1912. Knighted by King George, 1915. Sir Wilfrid Laurier said of him: "He has done more in his day and generation for the upbuilding of the militia of Canada and the Empire than any other man."

Britain and the Dominions is untenable and cannot continue. A Dominion which sends to a European war an army immeasurably greater than the allied armies sent to the Crimea cannot again have the issues of peace and war determined for her by a government in which she is not represented. This I may say in full confidence of the righteousness of the British cause, and, naturally, with full approval of the action taken by the British Government in going to war. Some solution, however, must be found for the situation in which we find ourselves.

The proposition which, to my mind, meets the requirements of the case would be a full partnership federal union, the United Kingdom forming one unit, Canada forming another unit, Australia another unit, New Zealand another, the Union of South Africa yet another, and possibly India and some of the great crown colonies, under some appropriate form, as other units. All these units should compose the federation. Each of these should retain the form of government which suits it, with no loss whatever of autonomy, but with the advantage of the prestige and power which membership in the Imperial Council would confer. To my mind there should be one great Imperial Parliament over and above these local parliaments. This Great Empire Parliament should be entirely distinct from the present British Parliament or the present colonial parliaments. This Imperial Parliament should not deal with the local issues which we find agitating the English, the Australian, or the Canadian Parliaments. It is not necessary that the question of elementary education in England, or whether grouse should be shot in Scotland on or before a certain date, should be handled by the same men as those who are guiding the foreign policy of the whole Empire. The Imperial Parliament should deal simply with Imperial interests, with international and financial, with military and naval problems.

One field for the work of the Imperial Parliament would be preferential duties. I have long held that there should be a minimum tariff whereby goods coming from any foreign country into any part of the British Empire should be taxed this minimum tariff, and that there should be a maximum tariff, which should be held by the Imperial Parliament

as a lever to control unfair or aggressive foreign nations who might nourish designs against the Empire. Recent revelations of the machinations of Germany in the financial and commercial worlds show conclusively, not only the value of, but also the real need for, such a weapon against the mean and underhand tactics of which the British Empire was the victim before the war. So far as the minimum tariff is concerned, the Parliament of Great Britain proper, for instance, might then, as now, allow to come in from the various outlying parts of the Empire, absolutely free, or otherwise, any of their products she chooses to import; she should control her own tariff, but any foreign country would pay the minimum preferential duty. In the same way Canada might import her woollens from Great Britain at whatever rate she chooses to impose upon them, but woollens coming in from any foreign nation would be taxed the preferential duty.

In the full partnership union I propose, each and every part of the great Empire would be in duty bound to look after a large share of its own local defences, and to bear a hand in any great war which would threaten the stability of the whole Empire. We should have a popular system of military service and training from school-age to manhood. That system is the antithesis of militarism. A military training does not necessarily mean militarism. I have no apology to make, when I say that any man who ever had a military training is the better for it. I am free to say that the young men of Canada who have received a military training in their schools and colleges are, other things being equal, better men in every respect than those who have not received that training. In addition to being better citizens, they are ever ready in case of need to step forward for the defence of the great Empire to which we belong. There was a time when I was ridiculed for saying this; the events of the last year have shown how right I was, and how valuable has been the training that our young men received in the Canadian militia and the cadet corps. I advocate military training from youth to manhood in this country, and in all of the five free nations which form the British Empire to which our highest loyalty goes. I trust the time is not far distant when every young

man, every boy old enough to stand in the ranks with a rifle, will be trained to take his place as a soldier in the hour of need. When the white men of the Empire are trained in this way, the Imperial Parliament will have behind its guidance of foreign policy a solid strength which will cause its wishes to be respected. And in that course is to be found the most effective means of putting down the real militarism which is alien to our free institutions.

The plan which I have sketched is very general, and its details would have to be worked out. They should be settled with the advice and the concurrence of all. My own idea is that an Imperial Constitutional Convention should be summoned, after due discussion by the Imperial Conference, and should, after mature and deliberate debate, draw up a scheme for the consideration of the various parts of the Empire.

In favour of a full partnership union, we have the tendency during many years towards union and amalgamation in our national, our geographical, and our political life. The old fear that large concerns cannot be successfully managed disappears in the light of history. When the Republic of the United States was formed, it was predicted that it could not last for any time, so with the union of Great Britain and Ireland, and so with all the federations which have become successful in history; and all have dissipated the fears so loudly proclaimed at their birth. History shows that combinations of great peoples have tended to the advancement of humanity. In the British Isles the combination of the great races has made that country what she is to-day. The wider combination of the proposed union would give to all British subjects—French-Canadians, Boers, Australians, Canadians of continental European origin from the western provinces, men of the United Empire Loyalist stock, New Zealanders, Newfoundlanders—equal chances in the government and administration and commerce of a Commonwealth with shores on every ocean, with lands in every clime, with resources and problems of every description. It is in large combinations, largely handled, that the future lies, and no combination will be more magnificent than the British Empire of the future, with its several kingdoms and dominions drawn together in full partnership union.

What are the alternatives? Independence has quite vanished from our politics; the blood that was shed at Ypres did not come from a country which is capable of bidding the Old Mother good-bye, of cutting adrift from her and her difficulties. Another proposal is that which has been put forward by Mr. Richard Jebb. He presents the idea of an Imperial union, and international alliance, the relations between which should be settled by consultation between the nations concerned by means of Imperial Conferences and permanent ambassadors, who should be Privy Counsellors and members of other governments. The events of July and August, 1914, have settled that proposal, attractive as it looked before the storm of war fell upon the Empire. We know at what breathless speed the negotiations proceeded in the days before the declaration of war; how could Sir Edward Grey have paused at each stage to consult and negotiate with four or five other governments? The plan lacks the one cohesive principle that any government must possess. There would be no cohesion in an Empire formed on Mr. Jebb's plan. To make a combination a success there must be cohesion, there must be the power of obtaining a revenue, there must be power of control, there must be a central executive. The history of all nations shows that.

I wonder if there are any left throughout the length and breadth of the land—an odd one here and there, perhaps—who adhere to the old idea of a general union of Great Britain and her colonies on a trade basis—free trade within the Empire—and otherwise remain as we are. The last year has swept that idea away. The blast of war blew that cobweb out of such Canadian brains as it lingered in, and none of us desired to sit still and let the old Motherland defend our liberties; instead our young men fought for places in the contingents.

Yet another school in the past has held that we should send men and money from the Dominion for the upbuilding of the British Empire. For an emergency this may well be done; we did not stop to bargain when the battle clouds lowered over the plains of Europe. As a settled policy it is a very different matter. We have no representation in the British Parliament, and the principle of no taxation without repre-

sensation is dear to our hearts. Preferential trade I regard as simply a stepping-stone to full partnership union.

Such is the view I have of the future of Canada—a view of a Canada, part of a world-wide, free Empire, the greatest in history; a view of a citizenship of a richness and a variety and a dignity, hitherto unapproached in the world's history; a view of brotherhood and of union, of full rights and fair play for small nationalities, of scope for the energies of all, of tolerance, of kindliness, and of strength. I think the time is approaching when something definite should be done. Great changes are not made by sitting still and thinking about them. Our first duty is to win the war. That done, it becomes our duty to unite in full partnership. And the way to unite is to unite.

THE FISHERMAN'S PARADISE

By C. W. Young *

Beyond a doubt Canada's most valuable heritage is her fisheries. The gold and other metals, when mined out of the earth, are gone and can never be replaced; the trees in the woods once cut down can be renewed only by years of slow growth, but the ingenuity of man can never pursue the fish to the depths of the ocean; purely fresh-water fish may be netted and dynamited and harried in all sorts of ways, but there must always be an inexhaustible supply in the salt seas.

Nature endowed some provinces of the Dominion more lavishly with fish life than others, but none were neglected. In those provinces swept by the Atlantic and Pacific oceans, the supply is larger and the variety greater, but the inland provinces, Manitoba, Saskatchewan, and Alberta, have still an abundance of valuable food fish, which will last for centuries yet, if only given reasonable treatment.

It is not the intention in these rambling notes, however, to enlarge upon the commercial aspect of Canada's fisheries, but to present a few experiences of fishing for sport that have come in the way of the writer, in a moderately long life, during which no chance to enjoy a day's fishing has been neglected.

Gaspé, the jumping-off place, where there is nothing between the fisherman and Europe across the broad Atlantic, was one of the first places to be colonized by the hardy Jersey fishermen who crossed the rough seas of the North Atlantic hundreds of years ago, and established dépôts for the catching and curing of cod.

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The history of the leading Gaspé firms, Robin & Company, the Collasses, Lè Bontieliers, and others, would make an interesting book of itself, but cannot be touched upon here.

It was my fortune to wander down the line of the Inter-colonial one summer, and happening to stop at the picturesque little seaside hamlet of Dalhousie, New Brunswick, to voyage from there to Gaspé Basin, on the old steamer *Admiral*, and to enjoy the marvellous beauty of the Bay of Chaleur, into which empty every few miles some of the finest salmon rivers in the world, whose clear waters attract anglers from every continent.

Gaspé became a habit, and a good one, and for many succeeding years I made my pilgrimage thither. There was salmon fishing when I was lucky enough to get it, but always sea trout and of good size, running up to six or seven pounds in some of the rivers. Of course one always likes to kill a salmon; the thrill of it remains as an experience of pure delight, but the man who cannot satisfy himself with lusty sea trout, which are chock full of fight and as bright as a silver dollar, must indeed be hard to please.

Gaspé has never been overrun with tourists, and as the land along the rivers is not cultivated much, or likely to be, there will be free trout fishing in tidewater with a fresh supply coming up every day, not to be exhausted or even substantially depleted for many years to come.

On one never-to-be-forgotten morning I was taking a cold dip in the St. John River, Gaspé, when my guide took up the rod that was leaning against the tent, and casting over the pool hooked a good, big salmon, one of thirty or forty which were to be seen disporting themselves. "I have hooked him, and you must kill him," he said, and thrusting my feet into slippers, I took the rod. For nearly half a mile the pool extended, the water was deep, and the shore was a ledge of rock almost as level as a billiard-table. With only nature's garb, and no clothes to impede freedom of action, I was led a merry dance by that early-rising salmon, which got the fly, if not the worm. The temperature was almost icy, though it was mid-July, but the violent exercise kept me warm enough, and I was in a healthy glow when the fight ended with a stroke of the gaff, and the pounding on the head with

a stone of the silver stick of cordwood, for he was as big as that.

All along the Bay of Chaleur, on both sides, the same conditions exist, but in the more frequented regions the trout are more fished over and harder to get.

When the mighty waters of the old original oceans ceased to pour through the channel of the Saguenay, they left behind them, as a legacy to future generations, salmon, which in course of the ages, being unable to get to the salt water, acclimatized themselves in their new conditions, and were christened "ouananiche" by the Indians, which may be freely translated, "strong as a horse". This they undoubtedly are. These fish are miniature salmon, and are to be found mostly in the waters tributary to the Saguenay. The casual tourist finds them with least trouble at the Grand Discharge, where the waters of the Lake St. John tumble down a hundred feet or more in a mile. In the very fiercest of the rapids lurk the ouananiche, taking the fly greedily when cast over them, and dancing out of the water on their tails—like the dear little kangaroo—when they feel the hook. The angler has his work cut out for him, if he hooks anything over a pound or two, and is not likely to forget the experience. If he escapes without a smashed rod he is lucky, for no fish equals the ouananiche for tricks.

The road from Quebec to Roberval is due north 200 miles, almost as the crow flies, a perfect net-work of rivers and lakes, and there is hardly a station at which one may not find trout-fishing within a short distance. From the car windows one can see the picturesque club-houses, and everywhere are indications of men on pleasure bent. Let no one, however, think he is going to fall into good fishing just because he wants to get it. With very few exceptions, the lakes and rivers are owned by clubs, and a stranger, without credentials, or without being properly introduced, would find trouble before he got out of ear-shot of the car whistles.

The early settlers in Ontario found every stream below Niagara Falls full of salmon, which came all the way from the sea to spawn, but the cutting down of the trees and the settlement of the country, with the consequent damming of the waters for industrial purposes, gradually drove the big

fish from their accustomed haunts, until to-day Lake Ontario and the rivers know them no more, and it is hard to believe the stories that in early days salmon filled the streams, as they do still in British Columbia. Within the memory of the writer, sea salmon were artificially spawned in a small hatchery near Bowmanville, and the fish manipulated there and marked were caught afterwards in the Gulf of St. Lawrence; but those days are long since past.

When a boy, living on the banks of the Credit River, I used to catch speckled trout almost off my father's door-step, or, at any rate, within a few hundred feet, and a word in the evening was sufficient to get a dozen or so in the early morning before breakfast. There were still a few salmon in the Credit, which had managed to wriggle past the dams at the embryo settlements, and the memory of a fight with one of these monsters still remains, after over half a century.

The wild pigeons lingered on the scene longer than the salmon. I can remember them in countless millions, flying past for days and days, and so common and so easily killed that they were no luxury. The young birds were slaughtered in thousands in the rookeries, and salted and smoked for winter, when they formed a considerable item in the bill-of-fare of the early settlers. In the sixties they began to get scarce, owing to the incessant persecution by market hunters, and in the middle or late seventies these beautiful birds vanished from the face of the earth, and are now as extinct as the dodo, or the great auk. This may be regretted, but it was inevitable. Flocks of pigeons, even if there were only one where there used to be thousands, would destroy all the grain in the country and make farming impossible.

In the older parts of Ontario, speckled trout hardly exist in the wild state. Almost all the waters that have not been ruined by the destruction of the forests are preserved, and to pay by the pound for what liver-fed trout you can catch with a fly, in ponds adjacent to a country club, does not appeal to a lover of nature.

In the northern woods, where the woods still keep the streams cool, and the chubs and suckers have not made themselves too much at home, there is trout-fishing to dream about. Those who like lake fishing may have it, but give me a good

stream, shallow enough to wade in, with rippling rapids and occasional deep holes, and the cup of joy will be full. Such streams one can find in Algonquin Park, an enormous area very wisely set apart some years ago as a national recreation ground, and a snug harbour for game and fur-bearing animals, the killing of which is prohibited within the park limits, and they have increased and multiplied exceedingly. Nor do they recognize the metes and bounds set by the government, but wander at their sweet will, and the men who go to the north for moose and red deer and partridge in their season, can thank the forethought of our provincial rulers for what luck comes to them.

There is no restriction upon fishing, except the reasonable one that not more than a certain number shall be killed daily, and that one shall obtain a license to traverse the park, which costs but a trifle, and contributes something to the expense of looking after the vast area.

Algonquin Park is a maze of lakes and rivers. Hotels are provided in the southern part, where one can live in luxury and get the finest kind of trout and bass-fishing, and sleep between snowy linen every night; or one can hire a guide and take to the woods, and wander here and there as long as the provisions last, resting in a tent at night if one be so minded, or using the shelter-houses; one is never very far distant.

The northern part of the park is not so well known, but is a favourite haunt of those who do know it. It was my good fortune for several years past to enjoy the hospitality of the contractors in the construction camps along a new line of railway, where red and gray trout were in abundance, not only in the lakes, but in rivers of good size, and one had to return most of his catch to the water to keep within the limit.

Of Timagami and the long stretch of lakes and woods and rivers that it opens up between the railway tracks and Hudson Bay, I can speak only by hearsay, but can easily believe anything that is said about it.

As one travels along the line of the Canadian Pacific Railway west of North Bay, one sees rivers and creeks innumerable, where one just knows the trout are waiting to be caught, and when Lake Superior bursts on the view for the first time, one is lucky indeed if he can spare a few days. Not only is

almost every stream a good one, but at certain seasons one can enjoy fly-fishing for big fellows in the lake itself, casting from the rocks, with no brush to catch the flies behind, and unlimited clear water to play the fish when hooked.

The Nipigon must be left to richer men than I, for the guides have been demoralized by men who do not care for money.

West of Lake Superior is another stretch of lakes with fish in most of them. I recall a visit to a lake south of Wabigoon, which fairly boiled with bass. Gamey enough they were, and of good size, but three people could eat only a few, and the rest had to go back in the water. Nearby was another lake, where muskallunge—the gentlemen of the pike family—abounded—great big fellows, up to thirty or forty pounds, which took a troll almost as soon as it was let out, and where the playing of them became a weariness.

The Winnipeg River, where its waters are confined by a power dam, near Kenora, is the only place I ever saw where the pickerel, pike, perch, wall-eyed pike, or dory, for he has all these names, acted like a game fish. In the St. Lawrence he is the best pan-fish we have, but bites sluggishly and fights not at all. In the clear, cold, rapid waters of the Winnipeg, however, he seems to take courage. He will jump out of the water at your bait like a trout, will take out line, and fight you every minute till you land him. He runs big, too, frequently up to six or eight pounds.

Fishing across the continent, as we seem to be, we take a jump to the Bow River, at Banff, where I have found, on several occasions, rainbow and other trout of good size, good fighters, and plenty enough to make it interesting.

One of the pleasantest experiences of the transcontinental trip is to watch the growth of the rivers. Far off in the distance, one sees what one takes to be a streak of snow on the mountain-side. As one nears it, it is seen to be a tiny mountain brook, which presently runs alongside the track, growing fast as other rivulets fall into it, until it becomes a respectable creek, and soon is a river. Your train follows it on an even grade for a time, then the water sinks, and the land rises, till you gaze down at a rushing torrent, a thousand feet or more below you, tearing its way to the sea. After a

while you see the Indians fishing, with a net, which they dip into the foaming rapids, and draw up with its load of glittering salmon; or others, standing on a platform, spearing the big fish as they climb towards their distant spawning-grounds. You see the fish split and hung up to dry in hundreds, and if your train happens to stop in the vicinity, a perfume that is not heavenly greets your nostrils.

Such a little stream empties out of Lake Louise, at Laggan, in the heart of the Selkirks, and one day, taking advantage of an enforced stay for several hours, I tried to find some trout in it. It was useless to cast a fly, I was told; a chunk of beef would suit the appetite of the fish much better. The water came down at an angle of 45 degrees, or steeper, and I wondered how any fish could live or make any progress, but here and there the torrent slackened for an instant, and, casting my beef-baited hook in, I landed a nice trout of half a pound or so, and a string of a dozen or more rewarded an hour's fishing. This was in early September, but there were six inches of snow on the ground. Here and there above the snow one could see a cluster of blood-red Alpine strawberries on their long stems, and a very delicious morsel they were.

Looking down from the car window at Bonnington Falls, where the waters of the Columbia are chained to turn the dynamos that furnish the power for Rossland and Trail and Nelson, one is impelled to "wait over" a train and cast a fly over the pool below the power-house. It is an ideal spot for fly-fishing, but a good deal frequented. Not more than two or three trout paid the penalty of my curiosity, but they were real beauties.

All along the Crow's Nest route are trout streams innumerable, and at some of the stations men come on board with so many trout that it seems a shame to kill them for sport.

The unusual experience of a day trip from Vancouver to Victoria gives one an idea of a sea full of fish, for everywhere are seen the silver salmon leaping in the sunlight, and when, on the return trip, one goes up the Fraser River to New Westminster, sails through the fishing fleet, and sees the thousands of small boats, each making a catch of salmon, one gets a faint idea of the enormous numbers of salmon that throng these waters. At Steveston or New Westminster, one

goes through the canneries; sees scow-load after scow-load of salmon pitchforked onto the floor; sees the almost automatic process by which they are cleaned and packed into cans, and has, thereafter, no prejudice such as follows the inspection of other factories for the making of "eats" of various kinds. Or one is beguiled into one of the huge refrigerators, where the large salmon, weighing well into a hundred pounds, lie on slate slabs and are frozen solid in a few hours. It is a hot day, but one comes out shivering. The sight of these silvery monsters in their thousands is one worth remembering.

At the hotel in Victoria one inquires about fishing, and is told that Pacific salmon do not take the fly, which one knew before, but that it is no trick to get them with a troll. There is a very early start one morning; a boatman takes one out a mile or so from the very heart of the city, and almost as soon as the spoon begins to draw, a strike, and a fight to remember. If the Pacific salmon do not rise to a fly, like their Atlantic cousins, they can fight just as sturdily, and if played with a light steel rod, give one all the fun one is looking for. There was not very much time to spare on the occasion I have in mind, and a couple of salmon had to suffice, but they were good ones, and were in the hotel soon enough to be cooked and enjoyed at a late breakfast.

So we have fished here and there from one ocean to the other. Only good days have been told of, but there have been plenty of others, when neither Jock Scott, nor Silver Doctor, Parmachene Belle, or Cochy Bondu, plain Brown Hackle, or even common ordinary fishworms, a live frog, or a chunk of beef, would lure the finny epicures. They simply wouldn't come, that was all there was to it, and one just had to make the best of it.

There are days when the fish won't bite;
It's either too calm, or else it's too rough,
It's either too warm, or not warm enough;
The wind's the wrong way, or the moon's not right;
It's either too cloudy, or the sun's too bright;
It's either too wet, or else it's too dry,
Or for some other reason—you can't tell why—
There are days when the fish won't bite.

There are days when the fish won't bite;
 You may try every bait, you may try every lure,
 You may do what you will, and wait and wait,
From morning till noon, and from noon till night,
But you won't get a nibble, tho' you try all your might;
 You may grumble and swear,
 But the fish don't care,
There are days when the fish *won't* bite.

But there are days when the fish *will* bite;
 When it's not too calm, and it's not too rough;
 When it's not too warm, but just warm enough;
And the big, old fellows, oh, joy! how they fight!
Your rod's bent double, as you keep your line tight;
 How they leap, how they run!
 Gee whiz! but it's fun
On the days when the fish *will* bite.

THE EX-SOLDIERS' OPPORTUNITY

BY THE HON. W. J. ROCHE, M.D., M.P.*

In the great struggle now going on Canada realizes a double duty—to furnish her due quota of soldiers for the front, and to help supply the Mother Country and her allies with the foodstuffs which are of such vital importance in waging a successful war. Seized of this latter fact, the agriculturists of the Dominion are making the most strenuous efforts not only to extend the areas of cultivated land, but also to intensify its productiveness while conserving its strength. The war has been responsible for more serious thought having been given to this subject since August, 1914, than would under ordinary conditions have been devoted to it in many years.

That Canada is able to support, in comfort and prosperity, an almost unlimited number of farmers, ranchers, and fruit-growers is a fact beyond dispute. In many instances the settler can obtain land at a minimum cost. All branches of stock-raising and agriculture are equally open to him.

The more thorough-going and hardworking, thoughtful and earnest the man, the more certain will be his success.

The day is rapidly passing when the average man, be he merchant, farmer, or workman, is unconscious of the past, and unmindful of the future. A new era has dawned and that great vital force, the inexhaustible energy of the masses, will be directed to bettering conditions and raising the standard of life generally, the result of which, to the nation, as well as to the individual, will be beneficial beyond measure.

The disorganization of trade and the consequent rapid increase in prices of goods purchased from belligerent nations

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has awakened Canadians to the immensity of their importations, consisting in many cases of goods which could, and should, be manufactured within the Dominion. This has given rise to the "Made in Canada" cry, which, while now only in its infancy and a direct outcome of the war, is certain in years to come to have an important bearing upon the life of the nation.

The lessons learned through strife will continue to bear fruit when our soldiers return victorious from the battlefields of Europe. Apart from the vastly increased areas of land under cultivation, new industries springing up in our cities from coast to coast, will furnish fields of employment for the thousands who must inevitably be thrown out of work when a large army is disbanded. For this phase of the readjustment of conditions capital will be required and thousands of investors in the Mother Country looking for profitable investments, when peace is declared, will doubtless look to Canada as a good field.

Realizing that it is her duty to produce to the maximum of her capacity, both in quality and quantity, Canada expects to continue, as the years go by, to become a more and more important part of that Empire of which she is proud to be a portion.

POSSIBILITIES FOR PEAT DEVELOPMENT

BY EUGENE HAANEL, M.A., Ph.D., F.R.S.C.

Owing to increasing population, and the complex demands of modern civilization, the resources of nature are being more extensively exploited and utilized, at the present time, than in any other period in the history of the world. Especially is this the case with fuel in all its varieties, since upon this commodity depends the successful utilization of all other natural resources. Those nations, therefore, that are in any way dependent for this all-important material upon other nations, find themselves very seriously handicapped in the struggle for existence in the field of industry and commerce.

Canada has been generously supplied by nature with the solid, and—as far as yet known—to a lesser extent with the liquid and gaseous fuels. Unfortunately, the extensive coal deposits are situated in the extreme east and west—too far distant to render them economically available for use in the central provinces of Canada, which are without coal measures. These provinces, therefore, have to be supplied with fuel from a foreign source. However, this supply may not continue; conditions may change, and change suddenly, cutting off the supply without warning. For such an event, Canada has made no provision; no extra store has been accumulated to meet such an emergency. A few years ago a strike of coal-miners in the United States demonstrated that such an event must be reckoned among the possibilities. I need not point

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out that other causes than strikes might deprive us for long periods of time, or altogether, of this outside source of fuel. The alarm sounded regarding the early exhaustion of certain fuel deposits and other natural resources will, undoubtedly, before long cause nations to prevent exportation of such of their resources as are needed for their own use. The imports of bituminous and anthracite coal increased from fourteen and a half million tons in 1912, to eighteen million tons in 1913—an increase of about 28 per cent. It is, therefore, of the utmost importance that provision be made for such emergency by seeking within our own territory the means of supplying this all-important necessity—fuel! Fortunately, nature has provided a substitute for coal and wood, in the extensive peat bogs scattered throughout the central provinces. It has been estimated that the known peat bogs of Manitoba, Ontario, Quebec, and New Brunswick cover an area of 12,000 square miles. This is probably but a small fraction of the actual amount of this valuable fuel asset in existence in these provinces. Much of the peat contained in these bogs is of excellent quality, well adapted to the manufacture of peat fuel, and is conveniently situated with regard to railway and water transportation, and distribution to contiguous industrial centres. Consequently, it is to this source of fuel we must turn, if we desire to reduce the very large and rapidly increasing imports of coal into the central provinces, and thus render ourselves—to some extent—independent of foreign sources for our fuel supply.

Many attempts have been made in Canada to utilize these peat resources for the manufacture of fuel, but up to recent times with little success, and with large waste of capital. The reason for these failures is due to a lack of knowledge of the nature of peat and of the results of experiments made in the peat-using countries of Europe, in the effort to develop a commercial process for the manufacture of peat fuel.

Peat, as contained in the average well-drained bog, contains upwards of 90 per cent. of water, the remaining 10 per cent. representing the heat energy, plus the ash, of the substance. The problem, therefore, with which we are confronted is the removal of this water content and the conversion of the remaining substance into a convenient and satisfactory fuel.

At first sight, this would appear to be an easy problem to solve, and, indeed, has been so considered by the majority of those who have attempted to invent a process for manufacturing peat fuel in Canada; but it is just the opposite. A considerable portion of the water content of raw peat is not held mechanically, but is contained, according to the theory of many investigators, in the gelatinous substance always found, to a greater or less extent, in all classes of peat. The water thus held cannot be removed by pressure. On this problem, alone, large sums of money have been expended, but up to the present time not one of the many processes advanced—as having solved the problem—has proved economic.

To destroy this colloidal substance—"hydrocellulose", which prevents the removal of its contained water by pressure—Ekenberg subjected the raw peat, in closed retorts, under pressure, to a temperature of about 220 deg. C. Under these circumstances, the hydrocellulose is decomposed, and carbonization takes place. Even with this process the water content of the carbonized substance could not be reduced below 70 per cent., under commercial conditions.* It is consequently necessary, in order to render the carbonized and pressed substance into a saleable fuel, to reduce further the water content by artificial heat, or by open-air drying, the former of which has not proven economic. This brings us at once to the only process or method of manufacturing peat fuel which, at the present time, can be called economic and commercial, viz., the "wet process", or "air-dried machined peat process."

As the name implies, the water content is removed by the action of the sun and wind, hence does not call for the expenditure of artificial heat. The other details of the process may be simply described as follows:—the raw peat, removed by manual labour, or some form of mechanical excavator, is subjected to a grinding or macerating process in a specially designed mill, consisting of an enclosed cylindrical casing, on the inside of which are two sets of opposed knives, one set of which revolves on a central axis against the other set,

*Report on "Peat, Lignite, and Coal, their Value as Fuels for the Production of Gas and Power in the By-product Recovery Producer." Published by the Mines Branch, Department of Mines.

which is fixed. The raw peat is fed into a hopper at one end, and is forced through the revolving knives to the spout, or mouth-piece, through which it emerges ready for drying. This process converts the raw peat, containing fibres and small roots, into a uniform pulp in which the gelatinous constituent is uniformly distributed. After passing through the pulping mill, the treated peat is spread upon the drying-field, where it is rolled into a sheet of uniform thickness by a Jakobson field press, or some other mechanical spreader. The spreaded mass is then cut, either by hand or automatically by mechanical means, into blocks, called bricks, of suitable size. In drying, the gelatinous constituent forms a thin skin over the surface of the peat blocks, which, when exposed to dry weather, permits the drying of the peat to continue, but in damp and rainy weather this skin swells, by absorption of moisture, preventing the moisture of the atmosphere from penetrating further into the peat brick. It is this valuable property of the gelatinous substance which renders the manufactured peat impervious to moisture when the drying has once been begun, and permits resumption of the drying operation in fair weather. Moreover, the hydrocellulose serves to bind the peat substance together, so that the resultant peat block, when ready for use, is firm, hard, and dense, and is capable of long haulage and rough handling, without breaking or crumbling into small fragments. This, in short, is the only process which can to-day be successfully applied in the manufacture of peat fuel.

In all European countries the peat fuel industry is generously assisted by their various governments, all of which have departments or bureaus for the express purpose of investigating problems vital to the economic and intelligent uses of peat, and for safeguarding the interests of both the inventor and the peat manufacturer. This system has greatly tended towards stimulating the peat industries of the different European countries, and has placed their peat deposits on the list of valuable resources. In Russia, the manufacture of peat fuel is actively prosecuted—notwithstanding the fact that the country has vast resources of other classes of fuel—and reached an output, in 1914, of over 7,000,000 metric tons. This fuel was manufactured with considerably over 1,300

peat machines of the Anrep and other types, which depend entirely on manual labour for the excavation of the peat and other of the operations. This tends to show that, if peat fuel is considered to be a valuable fuel in Russia, and can be profitably manufactured under commercial conditions, there is every reason to believe that such an industry can be successfully inaugurated in Canada, where the demands for imported fuels are constantly increasing, especially, if mechanical appliances for performing the operations now depending on hand labour are embodied in the machine employed.

In order to assist in the establishment of a peat industry in Canada, and to reawaken the confidence of the public and the capitalists in the commercial and industrial possibilities of our vast peat resources, the Government of Canada, in 1907, sent a commission to Europe to study the status of the peat industry in the peat-using countries, and to make recommendations for further action. The report embodying the results of this investigation was published in 1908, and was entitled, "Peat and Lignite: Their Manufacture and Uses in Europe". This report was accompanied by the recommendation that the government acquire a suitable peat bog, and erect thereon a small peat-manufacturing plant of the type most successful in Europe, for the purpose of demonstrating a commercial process which could be inspected and studied by those interested in the development of our peat resources, and who were desirous of engaging in the manufacture of peat fuel.

The plant chosen was of the Anrep type, of a capacity of about thirty tons of 25 per cent. moisture peat fuel per day of twelve hours. It consisted of a macerator, elevator for transporting excavated peat from trench to macerator, rails, switches, and a Jakobson field press. The cars, elevator, and macerator were operated by a thirty horse-power, peat-burning locomobile. The operations of excavating, spreading, cutting, turning, and harvesting the peat were performed by manual labour. The digging of the peat to the spreading of it on the field required the services of fourteen men, which in a country where high labour wages obtain was manifestly uneconomic, but even under these conditions it was demonstrated that peat fuel could be manufactured at a cost of

under \$2.00 per short ton on the field. In all, about 3,300 tons of 25 per cent. moisture peat were manufactured during the three seasons the plant was in operation.

As a result of the experience gained, the writer recommended that all peat plants erected in the future should be equipped with mechanical excavators and other labour-saving devices, operated by electricity, and that the plant should be operated in two shifts of ten hours each per day, the field of operation to be illuminated by electric lamps during the night shift. The importance of operating day and night will be realized when it is stated that the average length of season during which peat can be successfully manufactured in Canada by the process outlined does not exceed 110 days, and, on account of atmospheric conditions, may be less. Operating, therefore, in two shifts would consequently approximately double this period. Peat cannot be manufactured when frost sets in, since the peat fuel laid out for drying, if touched by frost, or frozen, crumbles to pieces.

For the purpose of further assisting the establishment of a peat industry, and also for the purpose of obtaining accurate information concerning our available peat resources, the Mines Branch undertook, several years ago, the systematic investigation of the peat bogs situated in the more inhabited portions of the Dominion. This investigation consists in the surveying and accurate sampling of the bogs in order to determine their size, capacity, and quality of peat. Up to the present time, approximately 120,000 acres situated in the provinces of Quebec, Ontario, Nova Scotia, Prince Edward Island, and Manitoba have been surveyed, and information regarding the quantities of peat available, its quality, and fitness for the manufacture of fuel, or for other purposes, is now available to the public. All reports describing the results of such work are accompanied by chemical analyses of the samples obtained, and a statement of their heating value.

The enormous potential energy represented by the vast areas underlaid by peat may be better appreciated when it is stated that the 12,000 square miles of peat bogs before mentioned represent a fuel value of 9,300,000,000 tons of 25 per cent. moisture peat fuel, which is equivalent in heating value

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to, approximately, 5,400,000,000 tons of anthracite coal. Such an amount of peat would supply fuel to approximately 5,300,000 families for 100 years, assuming each family to consume an amount of fuel per annum equivalent in heating value to ten tons of the best anthracite. This calculation is based on the fact that one square mile of peat bog with an average depth of six feet, will produce 774,400 tons of peat fuel, containing 25 per cent. moisture, and the further assumption is made that all the available peat is manufactured into fuel.

As a result of the demonstration of the small peat manufacturing plant erected by the government on the Alfred peat bog, a larger and more modern plant, equipped with mechanical excavator and other labour-saving devices, has been erected and operated on this bog by private parties, who had purchased the bog from the government. The excavator, aerial cable-way for transporting pulped peat from the peat machine to the drying field, and the mechanical spreader are all operated by electricity, generated in a power-house situated a short distance from the bog. Since this plant has not yet passed the experimental stage, no details concerning cost, etc., are as yet available.

PEAT AS A SOURCE OF FUEL FOR POWER PURPOSES. In order to demonstrate the feasibility of utilizing peat for power purposes, the Mines Branch erected in Ontario, about eight years ago, a complete peat producer-gas power plant of 60 B.H.P. capacity. This plant was of the type which had been in successful commercial operation in Europe, and was designed for the exclusive use of peat. A large number of tests were conducted at this plant with peat fuel, manufactured at the government peat fuel plant at Alfred, which contained moisture varying from about 18 to over 46 per cent. The results published in the report on the "Utilization of Peat Fuel for Power Purposes,*" to which the reader is referred for more detailed information, showed that a B.H.P. hour could be generated, under commercial conditions, with $2\frac{1}{2}$ pounds of peat fuel, containing 25 per cent. moisture. The heating value of the fuel with this moisture content was 6,750 B.T.U. per pound. On this basis, the consumption of fuel per B.H.P. year of 6,000 hours would be $7\frac{1}{2}$ tons, and the

*Report 154, Mines Branch, Dept. of Mines.

fuel costs, assuming that peat can be manufactured and delivered to the plant, which is supposed to be erected near, or on, the bog, for \$1.50 per ton, will be \$11.25. This applies only to plants of small powers, but compares favourably with a producer-gas power plant designed for burning bituminous coal. In this case, the coal delivered to the producer is assumed to cost \$4.00, and the consumption per B.H.P. hour is $1\frac{1}{2}$ pounds; under these conditions, the fuel costs would be \$18.00 per B.H.P. year of 6,000 hours.

It has been demonstrated, therefore, that with peat fuel, costing from \$1.50 to \$2.00, delivered at the power plant, power can be generated from peat at a price sufficiently low to permit of its competition with coal or other fuel. Peat is an ideal fuel for burning in a gas-producer, since it does not clinker to any extent, and leaves a fine, white ash, which easily finds its way through the bed of fuel to the water lute or ash pit, where it is withdrawn; consequently but little poking or other attention is required, and the labour costs can be kept at a minimum. As a result of certain alterations made to the gas cleaning system, it has been possible to deliver to the engine a clean gas, which permits of its continuous operation for long periods without necessitating the cleaning of valves and other parts of the engine. The results of the tests further demonstrated that for this type of producer the peat should not contain more than 25 to 30 per cent. moisture.

For large plants of 4,000 horse-power capacity, it has been found far more economical to generate the gas in by-product recovery gas producers whenever the nitrogen content of the fuel permits of its economic recovery. In by-product recovery producer-gas plants, the principal by-product recovered is ammonia, the tar being consumed, generally, under boilers for reducing the quantity of fuel required for generating the requisite steam used in the process. It is in this way that the peat contained in certain of the Canadian peat bogs can be utilized to advantage, since the sale of the sulphate of ammonia obtained from the recovery of the nitrogen content of the peat will, under certain favourable conditions, either pay all costs of operation, or materially decrease them, thus reducing the cost of generating power, or permitting the power to be generated for nothing. In certain cases, however,

the nitrogen content of the peat of certain bogs appears to be sufficiently high to enable the process for the recovery of ammonia, or ammonium sulphate, to be conducted at a profit, without attempting to utilize the gas generated for power, or other purposes. For more detailed information concerning the utilization of peat for this purpose, the reader is referred to the report on "Peat, Lignite, and Coal: Their Value as Fuels for the Production of Gas and Power in the By-product Recovery Producer." In all calculations, made in connection with the utilization of peat fuel for power purposes, the minimum cost at which it was assumed peat could be manufactured and delivered to the plant situated on, or near, the bog was \$1.50 per ton of 2,000 pounds, and for burning in by-product recovery producers the peat, it was also assumed, would have a moisture content of from 30 to 35 per cent.

In the above report, it has been pointed out how certain peat bogs, favourably situated with regard to cities, towns, and villages, and which contain a sufficiently high amount of nitrogen, can be utilized in by-product recovery producers for the purpose of distributing a gas suitable for domestic or industrial purposes. A large manufacturing district in Staffordshire, England, is supplied in this manner, with gas for power and industrial purposes from coal burned in Mond by-product recovery producers. The use of the gas in this district would have been extended to include domestic purposes, but an existing parliamentary act, regulating the transmission of city or town gas, precludes the use of producer gas for domestic purposes. In Canada, however, it would seem imperative that some such scheme for utilizing the low-grade fuels of the middle and prairie provinces should be put in operation.

In order to show the large quantity of nitrogen which can be recovered from peat bogs in the form of ammonium sulphate, thirteen of the bogs so far examined in the Province of Ontario, which have a total fuel content of over forty million tons of 25 per cent. moisture peat, and an average nitrogen content of about 1.73 per cent. in the dry peat, are taken as an example. The nitrogen content of wet peat, i.e., peat containing 25 per cent. moisture, is 1.3 per cent., and this content of nitrogen amounts to $43,000,000 \times 0.013$, or

560,000 tons of nitrogen, which corresponds to a theoretical production of over two and a half million tons of sulphate ammonia. The quantity which can be recovered under commercial conditions will vary with the method employed for its recovery.

The nitrogen content of the peat contained in several of the bogs so far examined by the Mines Branch is considerably higher than 1.73 per cent., as the analysis of a sample of peat obtained from the Holland bog will show. The following analysis is fairly representative of the peat contained in the entire bog:—

Volatile matter	63.5	per cent.
Fixed carbon	26.2	" "
Ash	10.1	" "
Phosphorus	0.67	" "
Nitrogen	2.7	" "
Calorific value	7,980	B.T.U. per lb. on the dry sample

The importance of the recovery of the nitrogen contained in the solid fuels will be better appreciated, when it is known that the demand for the resulting sulphate of ammonia is rapidly increasing. The world's production of this substance increased from 420,000 metric tons in 1900 to 1,157,500 metric tons in 1911. Over 50 per cent. of the world's output of sulphate of ammonia is produced in England, Germany, and the United States. In 1900, England produced 213,000 metric tons; Germany, 108,000, and the United States 19,500 metric tons. This output was increased in 1911 to the following amounts:—England, 378,500; Germany, 400,000, and the United States, 127,000 metric tons. This clearly shows the increasing value of, and the necessity for, sulphate of ammonia.

Peat fuel has also been successfully utilized on an extensive scale in Germany for the production of power in steam plants. In the case of this installation—which is owned and operated by the Siemens-Schuckert Company—the peat fuel is manufactured by the government, and sold to the company. This plant, and the results obtained, are fully described and set forth in the report, "Peat, Lignite, and Coal, etc.," previously mentioned.

There are many other purposes for which peat may be used, *e.g.*, the manufacture of peat coke for metallurgical

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purposes; its dry distillation for the production of gas and coke for domestic purposes, and its distillation for the recovery of oils. None of the attempts made so far in these latter directions, have met with commercial success.

The principal use for peat, however, as far as Canada is concerned, is that of a fuel; and every effort should be made to turn to advantage our vast peat resources, and render, at least to some extent, the middle provinces independent of foreign supplies of coal, since a stoppage of our present imports of this fuel—which are continually and rapidly increasing—would prove to be a national disaster.

THE CALL OF CANADA

By C. C. JAMES, C.M.G., M.A., LL.D., F.R.S.C.*

Just a hundred years ago a number of men in County Wexford, Ireland, gathered together their families, packed up what household goods could be transported, and took ship at Dublin. After several weeks their sailing ship arrived at New York. The newcomers were met by the British Consul and arrangements made for their going forward to Canada. Land had been set aside for these British settlers in one of the districts of what was then known as Upper Canada, now the Province of Ontario. Under government direction they were able to take up farming, their former experience being of great value to them. As their sons grew up they also were allotted lands, and before many years the homes of these Old Country settlers had considerably increased in number, and a new era of prosperity had begun. To-day the descendants of that small group of Irish farmers are numbered by thousands. It may not be out of place to state that among that little band of settlers was the great-grandfather of the writer of this article. Go where you will through the older sections of Canada you will find descendants of the settlers of 1816, who came from England, from Scotland, and from Ireland. They settled on land set apart by the governments and were given such assistance as was necessary in those days. They prospered, and their descendants are to-day to be found in our cities and towns as well as upon the farms originally located. This was the beginning of the big overseas movement which grew in force and numbers in the succeeding fifty years. Ask any prominent farmer, manufacturer, business

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men, banker, or university professor in Canada to-day whence his family came and more likely than not he will tell you how his father, or grandfather, or great-grandfather came out from the British Isles in the past century. This pioneer settler may have had experience in farming or he may not; he may have had some money, but the probability is that his capital consisted mainly of a strong sturdy family, a few household furnishings, and an inexhaustible reserve supply of hope and determination.

Why do we refer to the year 1816? The Napoleonic wars were over, the soldiers had come home, the troops were being disbanded, and a new life was being opened up.

It is now 1916 and the conditions of 1816 will be repeated, but upon an immensely larger scale. The British soldier will soon be coming home, and hundreds of thousands of men, young and middle-aged, will be asking themselves the question as to where they can begin life anew with the hope of making good. The old life will no longer be possible. Conditions at home will be changed. The man who has fought for his country and for the highest human ideals will desire to settle down where he can best find the peaceful enjoyment of the ideals for which he has made sacrifices. The first thing that suggests itself is, that as the British Empire has staked its all upon the permanency of those principles which are the very essence and life-blood of its existence, he should and will desire to live and have his family live, and his descendants after him, in some part of the British Empire. An Empire that is worth fighting for is worth living in. Canada has given of her best for the Empire and now in 1916 she opens her doors to the Britisher as she did in 1816. What has she to offer?

LAND. There is no crowding in Canada. Everybody who wishes for a garden or a farm can have it without dispossessing anyone else. He can secure an improved farm, with good house and buildings, well stocked and having all the finished conditions of an old country home; he can for a moderate outlay get a farm in the condition of early improvement; or he can settle upon a tract of virgin land that has never felt the plough. In no other part of the British Empire is there such an abundance of unoccupied land or such a great var-

ity of land, improved as well as unimproved. There are free lands for homesteads and improved lands for the most intensive production worth over a thousand dollars an acre. Between these two extremes the newcomer can find plenty to satisfy his requirements and his pocket, for land on the whole is cheap.

CLIMATE. The climate varies as much as the soil, from the districts where snow is little known, to the districts where winter and summer alternate, producing a hardy healthy people, the sturdy "Men of the North," men who have of late marched the streets of England's cities and who have held their own with the best British blood in the trenches of Flanders and France.

PRODUCTION. There is something attractive in living in a country that is capable not only of producing, but that is really producing, and that is rapidly increasing in its production. You are thinking of going to live with another people. You should enquire as to whether that people is progressive. It will be helpful and encouraging to you to be among those who are improving their condition.

Let us turn to the Census returns! In 1900 the capital invested in agriculture in Canada was nearly eighteen hundred million dollars (£350,000,000); in 1910 the capital invested amounted to over four thousand two hundred million dollars (£800,000,000). During the same years the land products alone increased in value from \$208,000,000 to \$416,000,000. The live stock on the farms increased from \$275,000,000 to \$630,000,000. Perhaps the best statement that can be made as to the nature of the farm community of Canada is that dealing with the year 1915—"The Year of Plenty." The Empire asked Canada in this great war crisis to increase her food output in addition to her generous contribution of men for the front. The response came from every province from the Atlantic to the Pacific and it was magnificent, notwithstanding the handicap of some shortness of farm labour. The field crops in 1915 aggregated \$800,000,000. The dairy output, which in 1910 was about \$110,000,000, jumped to \$150,000,000. In 1910 the egg and poultry product was about \$31,000,000, but in 1915 eggs alone reached \$30,000,000. The total net product from all the farms of Canada reached the

sum of over one thousand million dollars (£200,000,000)—an amount at least \$300,000,000 in excess of any previous year. No better statement can be made to prove that the soil, climate, and agricultural population of Canada are worthy of the best consideration of the British people, especially of those who are looking for a new home.

The Government of Canada is now considering ways and means whereby the British soldier, whether he has come from the land or from town or city life, may be directed to Canadian lands and be wisely assisted to make his life upon the land a success. The various provinces of Canada are giving careful attention to this most important matter. Boards of Trade and other public organizations also are discussing the question. There seems to be a feeling all through the Dominion that, when the war is over, immense numbers of British soldiers will be looking towards Canada as their future home, and that the British Empire will be greatly strengthened by having them placed in some of the Dominions overseas. Imperial, Dominion and Provincial Governments in co-operation will undoubtedly have ready well-prepared plans, whereby the soldier who has "done his bit" for the Empire may be placed upon the land in some part of Canada to continue his family life in peace, and with the assurance of comfort and reasonable prosperity.

THE CANADIAN CLUB MOVEMENT

BY FRANK D. ADAMS, Ph.D., D.Sc., F.G.S.A., F.R.S., D.C.L.,

The Canadian Clubs, which are found in every city and town of note in the Dominion, constitute one of the most noteworthy and distinctive features in Canadian civic life.

The movement which led to the establishment of these clubs originated in the city of Hamilton, Ontario, in the year 1892. The manner of its inception indicates, in a way, the scope and character of the movement itself. Two of the leading younger men of that city, having been solicited, in turn, to join one of the many national societies—each, in its own particular way, doing excellent work—declined, both feeling that they were ineligible. In a conversation which ensued, one of them suggested that a society in which those holding themselves to be simply Canadians could enroll, in order to devote themselves to promoting solidarity among Canadians and to the advancement of Canadian sentiment and true patriotism, would be a society serving a very useful purpose. While different groups of citizens were celebrating national festivities, and extolling quite legitimately the countries from which they came, the time seemed opportune to remind Canadians, of whatever origin, that they had—simply as Canadians—a country, a history, and a home. Those who claim Canada as the land of their adoption had come to the Dominion in order to better their condition. Had not Canada, therefore, as strong a claim on their gratitude and good-will as the country they had left behind them? Surely it was in

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the best interests of all Canadians that Canada should be one united Dominion, and a part of the greatest Empire the world has ever seen, rather than a great agglomeration of various peoples with divided aims and scattered aspirations. This thought rapidly grew to realization, and a Canadian Club was founded in the city of Hamilton.

The object of the club was defined as "the encouragement of the study of the history, literature, and resources of Canada, the recognition of native worth and talent, and the fostering of a patriotic Canadian sentiment."

The movement made a strong appeal to, and received an immediate response from Canadians generally, and especially from the more vigorous of the younger men throughout the length and breadth of the land, so that there are now seventy-five regularly organized Canadian Clubs in the chief centres of population from the Atlantic to the Pacific.

In an address to the Canadian Club of Montreal, delivered on March 10th, 1913, Viscount Bryce (then the Hon. James Bryce), who, as His Britannic Majesty's Ambassador to Washington, was brought into peculiarly close touch with all matters relating to Canada, spoke as follows:—

"I have long felt that the Canadian Clubs are an institution equally unique and excellent: unique, because I do not know of any other country in which there exists a similar organization of clubs, totally apart from party politics, and drawing unto themselves so much of that which is best in the community. The Canadian Clubs seem to express that public spirit which realizes that there is a great deal in life besides business and politics, and that an organization is needed which will give people the place and the opportunity of meeting, apart from business and politics, where only two things are recognized, the acquisition of knowledge and the interests of Canada as a whole.

"So it is especially pleasant to me, who knows nothing about business (laughter), and have forgotten all I ever knew about politics, to meet in our common interest in knowledge and in Canada."

The original lines laid down by the founders have been closely followed in the development of the movement, and Canadian Clubs have come to exercise a great and ever-

increasing influence on Canadian life. They have everywhere a large membership. The Montreal Canadian Club has an enrolment of about 1,700, those of Winnipeg and Toronto are of about the same size, the membership including most of the leaders in business and professional life in these chief centres of population.

Following the lead of the men, the women of Canada have organized Women's Canadian Clubs in more than twenty Canadian cities, and hold their own meetings, with similar objects and actuated by the same spirit.

In all these clubs the procedure at the meetings is essentially identical. The club meets at a lunch, held once a week or at less frequent intervals during the season, extending generally from November 1st to May 1st, special meetings being called during the other half of the year, if occasion arises. This luncheon is held at some suitable place in a central situation. A simple lunch is rapidly served, upon the conclusion of which the president of the club introduces the speaker, or guest of honour.

The expedition with which the meetings are conducted has in some cases called forth an expression of somewhat pained surprise from trans-Atlantic visitors, the rule—half an hour for lunch, and a thirty-minutes' address—being usually strictly adhered to; but herein lies an element of success, for everyone has to take lunch, and hence no one is too busy to attend the meetings of the club, which are, therefore, always well attended. Rudyard Kipling, in narrating his experience of the club, has stated that the "visitor is tied to a steak and made to tell the audience what he knows."

The speakers are invited by the executive of the club, and the subjects of address, for the most part, have a bearing on Canadian problems and questions of the hour; on the resources and the development of the country, or on Imperial questions, and the relations and duties of Canada to the Empire as a whole. Men representing very diverse views are invited to speak, so that the different sides of great national problems may be presented. Questions of religion and party politics are strictly excluded.

Every distinguished visitor from Great Britain passing through the Dominion is certain to be the guest of honour at

one or more of the Canadian Clubs, and during recent years there have been very few men of note who have passed through Canada, who have not spoken to one or other of these audiences. Many of the addresses, however, are given by men who are leaders in the Dominion, or who speak with some special authority on Canadian subjects. There are just two requisites which are looked for by the executive of the club in selecting a speaker—he must be a man who can speak, and one who has something to say which has a bearing on matters coming within the purview of the club.

Apart from the work of educating public opinion carried on by the Canadian Clubs, they frequently organize and launch upon their way important public movements. Thus the Canadian Club of Montreal, during the autumn of 1914, inaugurated, with success and amid much enthusiasm, the Patriotic League, for the purpose of providing, during the period of the war, for the wives and families of all men who have enlisted from Canada in the British, French, or Belgian armies. It also inaugurated, and largely staffed the Speakers' Patriotic League—out of which grew the Citizens' Recruiting Association—which organized public meetings, and provided speakers for the purpose of accurately informing the public concerning all questions relating to the causes and origin of the war, and the inherent righteousness of the British cause, and incidentally giving effect, through this educative campaign, to the stimulation of recruiting in any districts where the government decided that regiments for active service should be raised.

When the Belgian delegation was sent to Washington by the government of that country, at the opening of the war, it was upon the invitation of the Canadian Club that they came to Montreal, and addressed a series of crowded meetings and most enthusiastic audiences. These addresses contributed largely to a clear understanding of the Belgian case, on the part of Canadians, while at the same time the warmth of the reception given to the distinguished Belgian guests, after the somewhat chilly reception accorded to them in the United States, served to show them where Canada stood in relation to the Empire, the Allies, and the war.

The clubs in the various cities, while actually independent,

have a loose affiliation—the larger body being known as the Association of Canadian Clubs. Once a year, representatives of the affiliated clubs hold a conference at some city in the Dominion. In 1914 the meeting was held in Vancouver and in 1915 in Ottawa.

The Canadian Clubs are now recognized by the public men of Canada as the best forum from which to address the Canadian public, and by which to reach the actual heart and intelligence of the people.

Such, then, is the work which the Canadian Clubs are carrying on at the present time, and the question naturally presents itself—What influence is this work having, and to have, in the future development of the Dominion? As was recently remarked by the Hon. Martin Burrell, Minister of Agriculture, one of the chief difficulties experienced in the government of Canada is that of bringing the various provinces to an understanding of each other's problems, duties, and difficulties. One of the chief difficulties in coming to a common understanding is that the country is so immense, stretching, as it does from the Atlantic to the Pacific, a distance of 4,000 miles, some of the provinces being maritime states, while others are absolutely cut off from the sea and have to deal with the conditions which present themselves in inland countries. There are also provinces whose resources are wholly agricultural, while others have enormous areas, suited mainly to forest industries and to the development of the fur trade. Furthermore, there are unsettled tracts of country separating portions of the Dominion from one another, thus hampering travel and bringing about certain restrictions in the free movement of the population from one part of the country to the other.

Again, there has been an enormous influx of immigration into Canada in recent years. The Dominion, in proportion to its present population, is facing the problem of assimilating three times as many immigrants as was the United States at the time when the rush into that country touched its highest point. These immigrants come from almost every country in Europe, as well as from the United States, and although, fortunately, about sixty per cent. of them speak English as their native tongue, and have thus been brought

up more or less directly under the influence of Anglo-Saxon civilization, the others, though for the most part of good stock, have but little idea of free representative government, and the duties which a citizen must discharge, if such government is to be carried on in the true interests of and for the highest welfare of the people.

All these peoples, nations, and languages, if not melted into one whole, must be taught to live together in mutual understanding, and with mutual tolerance; must be raised to an ever higher level of civilized life, and with an ever-increasing pride in the country of their adoption, which will be the native land of their children and their children's children.

The people of the Dominion are just beginning to understand some of the difficulties to be confronted in the building up of a great, united, and successful country. While, therefore, all these and many other problems are clamouring for immediate or progressive solution, and while the various national societies of the old world, transplanted to the new soil of the western continent, subserve a worthy purpose in reminding the older generation of the rock from which they were hewed, young Canada finds in the Canadian Clubs a voice and movement which appeals to it as a force, whose whole momentum is directed to a unification of Canada, through a clear understanding of the problems which face her at the present hour. On the satisfactory solution of these problems the future of the Dominion as a happy, prosperous, and God-fearing country rests, forever remaining a nation within the British Empire, and playing its part in bringing about the realization for the world of all for which that Empire stands, lives, and fights.

LABOUR CONDITIONS IN CANADA AFTER THE WAR

BY THE HON. T. W. CROthers, K.C., M.P.*

What will be the opportunities in Canada after the war? We are to take it for granted, of course, that Canada will emerge from the war part of a victorious Empire, saved from the clutches of German militarism. This granted, the opportunities that await Canada are without number. We may, it seems to me, look forward, when the war is ended, to a renewal of the extraordinary activity which was so rudely interrupted in the summer of 1914. The war will not have changed or modified, in any way, the vast areas and resources of Canada, its unlimited potential wealth, and the invitation it has long been extending to the people of the Old World to cross the ocean and make their homes within the wide bounds of the Dominion. Rather, the invitation will be more cordial, more urgent than before, to the sons and daughters, particularly, of the parent land, and those other lands which have stood shoulder to shoulder with the British people in resisting the furious German onslaught. No doubt, special arrangements will be made to meet the particular interests and necessities of those soldiers who will be returning to the pursuits of peace.

The open-air life of the agriculturist, with a tolerable certainty of at least a comfortable living, will undoubtedly attract a vast number of men of mettle. Thousands upon thousands of women, many of them wives and sisters of those very soldiers, are performing a splendid service in carrying on the agricultural work of their motherland during these times of stress. In this work they are gaining practical

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knowledge and experience that will be of infinite value to them as worthy helpmates of their husbands and brothers.

Agriculture, in all its varied aspects—grain growing, mixed farming, dairying, and fruit culture—must remain the great outstanding opportunity which Canada offers, and must continue to offer, until a prosperous population spreads over its now sparsely-settled land from Nova Scotia to the Pacific Ocean. With the development of a great and ever-increasing farming community will come, also, more, and yet more thriving villages, flourishing market towns, and great and splendid cities, which will teem with every aspect of commercial and industrial activity. So that, looking but a little into the future—for we cannot but believe that entire victory will crown the armies of the allied nations at no distant date—there is every ground for the view that Canada will afford opportunities for every class; for the man without capital other than his labour, which, perhaps, in due time, will be most needed of all; for the man of small capital, whether he goes on the land, or into commercial life in the cities; and for the capitalist himself, who also will be needed and welcomed, for the assistance which capital will give in developing the great resources of the Dominion.

CANADA'S MINING FUTURE

BY JOHN McLEISH, B.A., F.S.S.*

In considering Canada's mining industry, either present or future, it must be remembered that this is a country geographically of continental extent, with physiographic features and rock structures of almost every known geological horizon.

It is not, therefore, surprising to find that a mining industry quite considerable, both in variety and extent, has already been developed. The settled portion of the country is practically confined to a comparatively narrow belt, extending 3,500 miles from Halifax to Vancouver. Prospecting and exploration have, of course, been extended into many regions beyond the reach of the ordinary means of travel, but there still remain enormous areas unknown to the explorer, while most of the districts already worked over have been touched only in a very superficial manner.

The official reports of the Departments of Mines of the Dominion and of the several provinces to which the interested reader should refer, furnish a vast fund of information respecting the country's mineral resources.

There are comparatively few of the metals and minerals known to commerce that have not been found either mineralogically, or in commercially important quantities.

A brief summary of the statistical record of the mineral production shows that the total value of the annual output has increased from \$10,000,000 in 1886, to over \$145,000,000 in 1913—the first year of the war, 1914, saw an output exceeding \$128,000,000—and embraces such a wide variety of products that some eight metals are now produced regularly, and seven others obtained occasionally, while among non-

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metallic products twenty-four separate minerals are annually mined or quarried, in addition to clays, stone quarry products, cement materials, etc.

Amongst the metals, Canada is already an important producer of gold, silver, copper, nickel, and lead, and to a lesser extent of iron and zinc. Her Cobalt output has driven other sources of supply from the world's markets, while antimony, platinum, palladium, tungsten, molybdenum, and mercury have been obtained in important quantities. Tin and bismuth have also been found in several localities, but have not been recovered commercially.

Although bauxite, the commercial ore of aluminium, has not yet been produced in Canada, the metal aluminium is produced or recovered in extensive reduction works situated at Shawinigan Falls, Quebec, from ores imported from France, Germany, and the United States.

There are numerous occurrences of feldspar, and it is possible that with improved processes of manufacture these may become important sources of aluminium in the future.

Ores of antimony, consisting mainly of stibnite or sulphide of antimony, have been found and worked in a number of localities in eastern Canada, chief among which are the mines at West Gore, Hants county, Nova Scotia, and in the parish of Prince William, York county, New Brunswick. There has also been an occasional recovery of the metal in the lead smelting and refining plant at Trail, British Columbia, antimony being a minor constituent of some of the silver-lead ores of southern British Columbia.

Stibnite has been reported in several localities in British Columbia and the Yukon, while more recently important antimony-silver veins have been found in the Wheaton River District, in the southern Yukon.

Arsenopyrite, or mispickel, ores are found abundantly in eastern Ontario, particularly in the county of Hastings. These deposits are usually auriferous.

In northern Ontario, mispickel has also been found in quantity on the shores of Net Lake, near Lake Timagami; in Davis township, Nipissing district; near Schreiber, on the Canadian Pacific Railway, and also in the Rainy River District.

The present production of white arsenic in Canada is being derived altogether from the silver-cobalt-nickel-arsenic ores of the Cobalt district, in Ontario, the arsenic being recovered as a by-product in the several smelting works situated at Thorold, Deloro, and Orillia.

Cobalt is being recovered, in the form of cobalt oxide and cobaltic material, containing nickel, or nickel oxide, and a little silver, in Canadian smelters situated at Deloro and Thorold. Other smaller plants are irregularly operated at North Bay, Kingston, and Welland. It is quite possible also that recovery is being made in other smelters, outside Canada, to which a considerable tonnage of these ores has been shipped. Canada has practically supplanted New Caledonia as a source of supply for cobalt.

Native copper has been found in Canada in many localities, though none of these deposits are being exploited, commercially.

Recent explorations have confirmed information obtained nearly a century and a half ago, that very important copper-bearing amygdaloids occur along the arctic coasts of Canada, near Coronation Gulf and in Victoria Land. The reports available seem to indicate the occurrence of copper ranges in this vicinity which cover an area greater than the well-known copper-bearing rocks of the State of Michigan.

In Nova Scotia, copper sulphide minerals have been found at a number of points, but no important producing mines have been developed. The better-known localities are Cheticamp, Lochaber, and Coxheath. In New Brunswick, also, no ore bodies of known commercial importance have been discovered, although small deposits have been found in a number of localities in the southern part of the province.

In Quebec, the most important producing district occurs in the vicinity of Sherbrooke, in the Eastern Townships. At the present time there are three active mines in this district, one of which has been in continuous operation for about thirty years. There are also a number of properties that are worthy of further investigation. The ores from the active mines are almost pure pyrites, containing some chalcopyrite, and occasionally a little chalcocite. The sulphur content of the ore, which runs over 40 per cent., is utilized for the

manufacture of sulphuric acid, and the copper is then recovered from the cinder residues obtained at the acid works, by blast furnace smelting, with other ores. The Quebec sulphide ores of copper nearly all contain small amounts of gold and silver.

The principal sources of copper production in Ontario at the present time are the well known copper-nickel deposits of the Sudbury region. Although these are of primary importance because of their nickel, the copper content is also exceedingly valuable. In the working-up of these ores a most useful alloy of nickel and copper, monel metal, is being produced without the primary refining of either metal. Detailed exploration has demonstrated a very large available tonnage of these ores, so that many years' supply is assured in one small area.

There are numerous other occurrences of copper in Ontario, some of which have been worked, and many of which, under sufficiently favourable conditions, will afford opportunity in the future for profitable industry.

British Columbia is at present the principal copper-producing province of the Dominion of Canada, copper-bearing minerals being found in numerous localities in various parts of the province. The known occurrences are too numerous to be considered individually in a review of this character. The principal districts in which important discoveries have been made are in southern British Columbia, in the West Kootenay and Kamloops districts; in the coast district at a number of points along the mainland; on Vancouver Island, and on some of the coastal islands. The most important active producing mines are at Rossland, at Phoenix, and at Motherlode, in the interior, and at Britannia or Howe Sound, Texada Island, and Granby Bay, on the coast. Prospecting exploratory work and development is also being carried on at a number of points, both in the interior of southern British Columbia, and at several coastal points.

Copper ores are also mined in the Yukon district.

There are three copper-smelting plants in operation in southern British Columbia. One at Trail treats the ores of the Rossland camp, producing copper matte, in which the precious metals contained in the Rossland ores are collected.

A very extensive plant, at Grand Forks, B.C., treats ores derived from Phoenix, in the Boundary district, and another at Greenwood smelts ores from the Motherlode and some other mines belonging to the operating company. Both of these plants are equipped with water-jacketed blast furnaces, and with Bessemer converters for making blister copper. On the coast there is a fully-equipped smelting plant at Ladysmith, on the east side of Vancouver Island, about sixty-five miles north of Victoria. This is a custom plant, and at present it is not being operated. A new plant has commenced operations at Anyox, on Granby Bay, and is treating ores from the surrounding districts, the greater tonnage, however, coming from the mine in the immediate vicinity belonging to the operating company.

All smelting companies in British Columbia smelt custom ores, in addition to treating ores from their own mines.

Gold is found in practically every province in Canada, with the possible exception of Prince Edward Island.

The production at the present time is obtained chiefly from the alluvial deposits of the Yukon and of British Columbia, the milling ores of British Columbia, Ontario, and Nova Scotia, and from a wide range of complex ores in British Columbia, which are not only copper-bearing, but most of which carry gold and silver values.

Gold was discovered in Nova Scotia in 1858, but 1862 really marks the beginning of gold-mining. Since that date the production has been fairly steady, though small.

The occurrence of alluvial gold in southern Quebec has long been known, the first recorded discovery being in 1824, on the Gilbert River, a tributary of the Chaudière, at a point about fifty miles south-east of Quebec city.

A small amount of gold, also, comes from the ores of the Eastern Townships, already referred to as being mined for their copper and sulphur content.

Amongst the various gold-bearing districts of Ontario may be mentioned the eastern Ontario gold belt, in Hastings and neighbouring counties, Parry Sound district, the Porcupine and Larder Lake areas, Wanapitei Lake, the district north of Lake Huron, Michipicoten, Shebandowan Lake, Sturgeon Lake, and Lake-of-the-Woods.

The eastern Ontario gold belt was first exploited in 1866. This district comprises the south-eastern part of Peterborough county, and passes through the northern parts of Hastings, Lennox and Addington, and Frontenac counties. There are many small mines in this area, which have been intermittently worked since discovery.

The Porcupine gold area is situated in northern Ontario, about 450 miles north of Toronto, and 120 miles north of the Cobalt silver district. The most important developments have taken place in the township of Tisdale, but promising discoveries have also been made in other townships in the vicinity, including Whitney, Ogden, Shaw, Deloro, and Langmuir. There are also producing properties in Munro and Guibord, near Matheson; in Otto, at Swastika, and in the vicinity of Larder Lake. As a result of the development of this northern area, the gold production of Ontario now exceeds that of either British Columbia or the Yukon.

Gold has been found in Manitoba, in the area lying south-east of Lake Winnipeg, and along the Ontario boundary.

Alluvial gold has been found in many of the rivers of Alberta, Saskatchewan, and the North-West Territories, though actual production has been limited to a small recovery from the Saskatchewan River, immediately above and below Edmonton.

Practically the first mining development in British Columbia was involved in the Fraser River gold rush in 1858, and succeeding years, when the Cariboo and Quesnel districts were discovered, followed, in 1874, by the discovery of gold in Cassiar.

Lode gold mining may be said to have commenced in 1890, with the staking of the Rossland gold-copper camp, followed by the discovery of the large, low-grade copper-gold ore bodies of the Boundary. These ores, though one of the main sources of the province's gold production, are complex gold-silver-copper ores, and are mentioned under the head of copper. Practically all the copper ores of the province are auriferous to a greater or less extent. There is a wide distribution of milling ores, and a considerable recovery of gold by amalgamation, or cyanidation.

There is still a very considerable production of gold from

the placer and hydraulic properties of the province, the chief centres being the Cariboo district, Quesnel, the Omineca, and Atlin, and there is yet much country which is comparatively unexplored. The gold is either in the original pre-glacial gravels, or in more recent deposits derived from these.

As early as 1878, miners began to enter the Yukon, and finds were made in various parts of the district from year to year. The news of the "Klondike" discovery resulted in the historic rush of 1897-8, a stampede which is probably unparalleled in the history of mining. The building of the Whitehorse and Yukon Railway, from Skagway to the foot of the Whitehorse rapids, greatly aided the development of the district.

While the present production is much less than the maximum, which was reached in 1900, the introduction of improved methods and large electrically-operated gold dredges has resulted in a regular output, which should continue for a considerable number of years, even should no new discoveries be made. New discoveries, however, may be confidently anticipated in view of the wide distribution of the gold in this territory, while the development of lode mines, just beginning, promises well for the future.

Although iron ores are widely distributed in Canada, the present extensive metallurgical industry in iron and steel has been developed to a very large extent on the basis of imported ores, chiefly the conveniently-situated and comparatively cheaply-mined ores of Bell Island, Newfoundland, and ores from the iron ranges near the south shore of Lake Superior. There are, nevertheless, a number of important iron-ore deposits that have already contributed considerable outputs, and there are numerous occurrences which in the future may constitute valuable sources of supply for this metal.

In Canada, lead is derived entirely from galena ores, the great majority of which are argentiferous and therefore, much that is said of silver is applicable to lead, and similarly, on account of associated blende, much that is said of lead covers the ground in connection with zinc.

There are numerous occurrences of galena in eastern Canada, but little or no production at the present time. Practically all the lead produced in recent years has come

from British Columbia silver-bearing galena ores. These ores have been mined chiefly in East and West Kootenay, in the southern portion of the province, although shipments have already been made from several mines in the neighbourhood of Hazelton, on the Skeena River. Development has been going on quietly for several years, awaiting the advent of transportation, and with better facilities shipments may be expected to increase rapidly.

The lead ores of British Columbia are nearly all shipped to the smelter of the Consolidated Mining and Smelting Company at Trail, which operates in connection therewith an electrolytic lead refinery, the products of which are refined gold, silver, and lead, copper sulphate, and antimony.

In the Yukon, there are several properties which have been developed, and have shipped occasionally, but in most cases as yet, the transportation charges have been found too heavy a burden. With further development of the country, these will probably become shippers.

The prospects of finding more lead ore-bearing areas throughout Canada, and especially in the more remote districts, are most favourable, and districts now known await only transportation facilities.

Molybdenum occurs as molybdenite, or molybdite, and has been found in numerous localities in many parts of the country. There has as yet been practically no recovery of the metal, with the exception of small amounts obtained while developing or exploring properties.

The nickel ores of Canada are amongst the most important of her mineral resources. Although there are other occurrences, the chief deposits are those of the Sudbury district, in Ontario. The silver-cobalt-nickel ores of the Cobalt district is the source of a small recovery of nickel oxide, but the present or prospective production from this source is negligible compared with the first-mentioned district.

The Sudbury nickel region occupies a basin thirty-six miles in length, from south-west to north-east, and sixteen miles in width. All the known ore deposits occur either along the edge of the sheet, or less than four miles away from it, on projections, or "offsets". It is found that the important deposits are not distributed uniformly around the basin, but

that there are rich portions separated by barren portions.

Practically all the ore hitherto mined and smelted in the region must be credited to what is known as the southern range. These ores carry not only nickel and copper, but also small amounts of gold, silver, platinum, and palladium. The output supplies at present about eighty per cent. of the world's consumption of nickel.

The present metallurgical practice in this region involves:—roasting of the ores in open heaps; smelting in water-jacketed blast furnaces, and converting the furnace matte in Bessemer basic converters, to make a matte containing about eighty per cent. copper-nickel.

The refining of the converter matte is accomplished in the United States and in England.

A very large tonnage of ore has already been determined in this district in the comparatively small areas that have been explored underground. The discovery and development of similar ores at the Alexo mine, near Matheson, north of Cobalt, demonstrates the probability that other similar deposits may be found as exploration progresses.

Both platinum and palladium occur as constituents of the nickel-copper ores of the Sudbury district, in Ontario, though in very small amounts. The precious metals are recovered from the residues remaining after the treatment of the mattes for nickel and copper.

Platinum has also been found in many of the gold placer deposits, its occurrence in this manner having been noted on the Rivère du Loup, Quebec; on the Similkameen, Tulameen, Tranquille, Fraser, North Thompson, and other creeks and rivers of British Columbia; on the Yukon and its tributaries; and the Teslin and other rivers of the Yukon district.

The silver produced in Canada at the present time is derived from three main sources, the silver-cobalt-nickel ores of the Cobalt district, Ontario; the argentiferous galena, of British Columbia, and the recovery at the smelters from the complex gold-silver-copper ores of the different provinces. There is also a slight recovery from gold mill bullion and from placer gold.

In Ontario, as early as 1846, veins carrying silver were found on the shores of Lake Superior in the district about

Port Arthur. The most famous silver mine was known as the Silver Islet, and the vein was found on a small island, some eighty feet square, lying near Thunder Cape. When the mine was abandoned, in 1884, work had been carried on to a depth of 1,160 feet, and it is estimated that \$3,250,000 worth of silver had been extracted.

The position that Canada now holds as a silver-producing country, being third on the world's list of silver producers, must be credited in large measure to the mines of the Cobalt district.

Cobalt, situated on the main line of the Ontario Government Railway, 330 miles north of Toronto, has the mines clustered round, and even beneath the town, while others are distributed in a south-easterly direction for a distance of four miles. This comprises the Cobalt silver district proper, and, while isolated, productive mines have been found in the outlying country; nevertheless, none of these newer discoveries have yet disclosed a district comparable to the parent camp. As a rule, the Cobalt silver deposits are not known to extend to great depths.

To offset this shallowness of the ore, the salvation of the camp seems to lie in the fact that the veins are numerous. The veins are approximately perpendicular, and vary in width from a mere crack up to twelve inches, or more, occasionally. The values are not confined to the rock itself, but in many cases extend into the adjacent wall rock, making a valuable milling ore. In exceptional cases this disseminated ore has a stopping width of fifteen feet, and from five to six feet is not uncommon.

There are several smelters in Ontario treating the ores from the Cobalt district. The products from these include, fine silver, white arsenic, cobalt oxide, nickel oxide, and in some cases a semi-refined mixture of the cobalt and nickel oxides.

A number of the larger mines in the camp have also established cyanide mills, and are recovering and shipping silver bullion.

The silver production of British Columbia comes mainly from the argentiferous galena ores of the province, already mentioned.

There has as yet been no commercial production, or recovery, of tin from Canadian sources, although tin minerals have been found in Nova Scotia, British Columbia, and the Yukon.

The tungsten-bearing mineral, scheelite, has been found at a number of localities in Canada, but the only place at which it has been worked, commercially, is at Scheelite Mines, Moose River district, Nova Scotia. A mill has been erected, and about fifteen tons of concentrated ore (72% scheelite) have been shipped. Scheelite also occurs at other places in this province, and has been found in Quebec, Ontario, British Columbia, and the Yukon.

The close association of zinc blende with galena, and its wide distribution, have made its treatment one of the economic problems to which a great deal of attention has been paid. There have been small shipments of zinc ores from mines in eastern Canada, but the principal producing mines at present are located in British Columbia. The majority of the British Columbia galena properties carry enough zinc blende to make its separation, and possible recovery, a question of much importance. All shipments are exported for refining.

Amongst non-metallic minerals, Canada produces an extensive variety of products. In many cases the output is limited only by the available markets and demand, and the ability to compete with other sources of production. Coal is at once the most important, while amongst the others that contribute most largely to the present production are included, asbestos, natural gas, gypsum, pyrites, salt, petroleum, mica, mineral water, quartz, corundum, etc.

A large proportion of the world's consumption of asbestos is supplied from Canadian deposits.

The present workable deposits are—as far as exploration work has shown, and with the exception of the Danville quarries—confined to the great serpentine range which strikes through the townships of Broughton, Thetford, and Coleraine, in the Province of Quebec. Leaving some scattered deposits in the townships of Wolfstown and Ireland out of consideration, the total length of this productive serpentine belt is twenty-three miles, with a width varying from 100 feet in the extreme easterly part, to 6,000 feet in the Mock Lake area; however, the serpentine belt, as a whole, in many places

far exceeds the width indicated above. Active mining began about 1880.

The deposits are worked by open quarrying, the long-fibred asbestos of the larger veins being readily separated out, while the smaller material is carefully cobbled. The separation was at first accomplished entirely by hand, but mechanical treatment has been gradually introduced and perfected, until now large mills are in operation in which the rock is broken and crushed in various ways, and the fiberized asbestos taken up from screens by suction fans, and blown into collectors, or settling chambers.

The output includes a wide variety of grades, from the long-fibred, crude asbestos, valued at \$300 per ton, down to the shortest mill fibre, valued at only \$2 or \$3 per ton, and "asbestic" sand, used for wall plaster, and valued at from 75 cents to \$1.50 per ton.

Though chromite is found in several parts of Canada, the only known occurrences of economic interest are situated in the Province of Quebec. In this province, it is found in irregular deposits in the serpentine rocks of the counties of Brome, Megantic, Richmond, and Wolfe. Some of these deposits have been worked, the principal ones being in the township of Coleraine, Megantic county. The ore in some cases is sufficiently graded for direct shipment, while in others concentration is necessary.

Canada is particularly fortunate in the possession of enormous coal resources. Coal-mining was one of the first mining industries to be established, and is still the most important in value of output. Though the development of this industry has been rapid in the past, it seems certain that its future growth will be even more rapid, owing to the settlement and influx of population into those parts of the country—more particularly in the western provinces—in which the principal coal-fields exist. Coal is found in five provinces, as well as in the northern territories, the relative importance of each, based on annual output, being as follows:—Nova Scotia, Alberta, British Columbia, Saskatchewan, New Brunswick, and Yukon Territory.

Two of the most productive of the Canadian coal-fields are situated on the seaboard, one on the Atlantic coast, and the

other on the Pacific coast, a fact which is very important from an Imperial standpoint. In each case these coal-fields are located on the respective coasts; both have extensive submarine extensions, and are fortunate in possessing fine natural harbours, capable of accommodating ships of any tonnage. Another coal-field is situated in the proximity of the metal-mining centres of British Columbia, and within easy reach of the copper and lead-smelting centres of both the southern part of the province, and of the adjoining States to the south. Large tracts of the new western Provinces of Alberta and Saskatchewan are underlaid by fossil fuels.

Following is a list of the principal coal-fields in the several provinces:—

Nova Scotia—Sydney field, Inverness field, Pictou field, Cumberland field.

New Brunswick—Grand Lake field.

Manitoba—Turtle Mountain field.

Saskatchewan—Estevan, or Souris, field.

Alberta—Belly River field, Frank-Blairmore field, Cascade field, Jasper Park field, Edmonton field.

British Columbia—Crow's Nest field, Nicola Valley field, Telkwa Valley field, Groundhog coal-field, Nanaimo field, Vancouver Island, Comox field, Vancouver Island, Suquamish field, Graham Island, Queen Charlotte Islands.

Yukon Territory—Tantalus field, Yukon River field.

Many of these coal areas are at present well developed, and producing steadily. In others, mainly in the western part of Canada, owing to lack of means of transportation, or present lack of market, only prospecting work has been done; but their coals constitute valuable reserves, which, in many cases, will be drawn upon in the near future, considering the rapid rate at which the West is developing, and the establishment of numerous new means of transportation, and of communication.

In the "Coal Resources of the World," Mr. D. B. Dowling refers to Canada's coal reserves as follows:—

"Canada has large supplies of bituminous and sub-bituminous coals, situated for the most part in the western interior, but there are also important fields on both coasts.

"On the Atlantic seaboard, bituminous coals are extensively

mined, and are used in general power production for manufacturing, and railway and marine transportation, as well as in the reduction of iron ore.

"The interior fields supply coals of various grades, the coals of the mountainous region of eastern British Columbia and western Alberta being the most important, and of the highest grade.

"In Manitoba and southern Saskatchewan, the coal-fields supply coals, lignitic in character, that are well adapted to domestic use. The extensive coal-fields of Alberta, which contain coals of wide range of character, form Canada's greatest coal reserve. The interior portion of British Columbia has many coal-areas that will be of value in providing coking coal for the smelting of the ores for which the province is famous. The fuels of the Arctic islands may, probably, be mined in the future, like the Spitzbergen coals, which lie in about the same latitude."

An estimate of the total reserve for each province is given in the following table:—

Nova Scotia	9,718,968,000	metric tons
New Brunswick	151,000,000	"
Ontario	25,000,000	"
Manitoba	160,000,000	"
Saskatchewan	59,812,000,000	"
Alberta	1,072,627,400,000	"
British Columbia	76,034,942,000	"
Yukon	4,940,000,000	"
North-West Territories	4,800,000,000	"
Arctic Islands	6,000,000,000	"
	<hr/>	
	1,234,269,310,000	"

Corundum mines are situated in the eastern portion of the Province of Ontario, in the townships of Carlow and Raglan, and mining operations have been in progress since 1900.

The corundum occurs in the form of crystals of various sizes, disseminated in syenite. The average corundum content of the rock treated does not much exceed 6 per cent., and, as 1½ to 2 per cent. are lost in concentrating, the recovery represents about 4 per cent. of the crude material.

Corundum-bearing rocks were first recognized in this area in 1897, and the mineral is found sparingly, but widely distributed, in the rocks of this district.

Feldspar has been mined in Canada since the year 1890. Practically the whole of the output is exported to the United States, where it is consumed in the New Jersey and Ohio potteries. Almost the entire production of Canadian feldspar is derived from the Province of Ontario, the principal mines being located in the county of Frontenac, about twenty miles north of the city of Kingston, on the St. Lawrence River. Formerly feldspar was mined to some extent, also, in the Province of Quebec, the deposits being located in Ottawa county. No development of these properties has taken place during recent years, the distance from the United States factories rendering mining unprofitable. One mine in this region yields a remarkably pure white feldspar, which is in demand for the manufacture of artificial teeth.

Veins, or dikes, of pegmatite (a rock having feldspar as its main constituent) are of common occurrence throughout large areas in both Ontario and Quebec, and have in some instances been mined for the mica which they often carry. These deposits vary in width from mere stringers of a few inches, to massive bodies of over a hundred feet. Such deposits, while, at the present time, often too remotely situated, or containing too many impurities in the way of accessory minerals, to allow the the feldspar being employed for pottery purposes without considerable expensive cleaning, constitute large reserves of the mineral, which may ultimately prove of value as a source of potash, or for other purposes.

Fluorspar has been mined in the county of Hastings, Province of Ontario, where a large vein of this mineral occurs.

Mineralogically, the occurrence of fluorite has been noted at several points in New Brunswick, Quebec, Ontario, and British Columbia, and one occurrence near Nelson, British Columbia, was investigated as a possible source of the mineral.

Graphite is found in many parts of the Provinces of Ontario and Quebec, and, to a lesser extent, in several of the other provinces.

Many large deposits of gypsum occur, distributed throughout Canada, the most extensively-mined areas being those in the Maritime Provinces of Nova Scotia and New Brunswick, where the mineral is found associated with rocks of the lower

carboniferous series. Many of these deposits are exposed in cliffs, which vary from 50 to 200 feet in height.

The quality of the gypsum, more especially the white rock found in Nova Scotia, New Brunswick, and Ontario, is of an exceptionally high grade. The output appears to be limited only by the demands of the market.

Magnesite is quarried in the township of Grenville, Argenteuil county, Quebec, about ten miles north of the town of Calumet. It has also been found in deposits of considerable size in Brome county, Quebec; in several localities near Atlin, British Columbia, and in Yukon Territory.

Ores of manganese are found principally in the eastern provinces of Nova Scotia and New Brunswick, though considerable deposits have been found on the Magdalen Islands, in Quebec, and occurrences have been noted at various points in Ontario, and on the east coast of Hudson Bay.

Canada is one of the principal mica-producing countries of the world.

The amber-mica deposits are comprised within an area of approximately 1,200 square miles, in the Province of Quebec, and 900 square miles in the Province of Ontario. The two districts are separated, geographically, by the Ottawa River, and geologically by a belt of sedimentary rocks about forty miles wide. The city of Ottawa lies between the two productive areas, and is the seat of the mica industry—all the important works engaged in trimming and in otherwise preparing the mineral for the markets being located in that place.

Deposits of white mica, also, occur in Canada, and occurrences of this variety (some few of which have been worked at various times) are known from Labrador in the east, to the Rocky Mountains in the west, while several Arctic expeditions have returned with good shipments from the far north.

Though the average dimensions of mica sheets do not much exceed three by five inches, plates of enormous size are sometimes obtained. Crystals have been found which measured over four feet across, and weighed nearly two tons.

Deposits of barytes are found in commercial quantities distributed throughout north-western Nova Scotia: at Lake

Ainslie, Inverness county; North Cheticamp, Inverness county; Five Islands, and Stewiacke, Colchester county, and near River John, Pictou county; they are also known to occur at several other localities in Canada.

The oldest, and, at the present time, the largest, natural gas-producing district is the territory bordering on the east and north shores of Lake Erie, in Ontario. The gas from this district is piped to all the larger towns in the southern peninsula, where it is used for industrial and domestic purposes.

In New Brunswick, an important gas-producing area is found in the counties of Albert and Westmorland. At the present time the gas is being utilized to supply the towns of Moncton and Hillsborough, and it is proposed, in the near future, further to extend the distribution.

In the Province of Quebec, in the vicinity of Three Rivers, a small quantity of gas has been obtained.

Natural gas has also been found in northern Alberta, along the Athabaska River. In the southern part of the province, in an extensive area, of which Medicine Hat is the centre, natural gas has been found in the Niobrara formation in a number of wells drilled to a depth of 1,000 feet. Wells drilled at Bow Island, forty miles west of Medicine Hat, encountered a strong flow of gas at a depth of about 2,000 feet, and this gas is being piped to Calgary, Lethbridge, McLeod, and other points in southern Alberta. South-west of Calgary, at Black Diamond, natural gas, high in gasolene, was found in the well which was being drilled in search of petroleum, and gas has been struck in practically all of the petroleum prospect wells of this district. The gas possibilities of Alberta, and other western provinces, may be considered to be exceptionally promising, and at the present time considerable progress is being made with a fairly good measure of success.

The peat deposits are quite extensive, and constitute an important reserve of fuel that has, as yet, been but little utilized.

At the present time the principal oil fields are situated in the peninsula of south-western Ontario, between Lake Huron and Lake Erie. The first oil was found in Lambton county

in 1862, and active production has been continued ever since.

In New Brunswick, in the district lying eleven miles to the south of Moncton, oil is being pumped in small quantities from the holes which produce the gas of this district.

In Alberta, although it cannot yet be said that oil has been encountered in commercial quantities, prospecting for it is being carried on vigorously. Seepages of oil have been found in several parts of the province, and in British Columbia.

In October of 1913, a light oil was struck in a prospect well near Black Diamond, south-east of Calgary, and as a result numerous prospect wells have been started. Crude oil has been struck in several of these wells, but at the time of writing it cannot as yet be said that a commercially valuable field has yet been developed.

Beds of bituminous shales, as at present recognized, are found in Gaspé, New Brunswick, and Nova Scotia. Those in New Brunswick are, without question, the most important. They occur in the counties of Albert and Westmorland, and extend in an easterly and westerly direction over a distance of forty miles. Extensive exploration, by means of diamond drilling and surface work, has demonstrated not only the quantity, but the quality, of these valuable deposits.

Tar sands are known to occur in Alberta, along the Athabaska River, for a distance of upwards of 100 miles north and south of Fort McMurray.

There are large deposits of the mineral phosphate, or apatite, which was at one time mined quite extensively, but which was driven from the market by the more cheaply mined ores of the southern United States. The greatest phosphate-producing area was the Lièvre River district, in the county of Ottawa, Province of Quebec. A very rich belt of phosphate-bearing rock traverses this region. In spite of the large quantities of apatite which have been taken from the old phosphate mines, the deposits are believed to be still very extensive, and they would doubtless be worked again, should a new use be found for the mineral, or should prices warrant it.

The chief domestic source of sulphur for industrial uses is the mineral pyrites.

Important deposits of pyrites occur in Quebec, in the

Sherbrooke district; in Ontario, in the Hastings district of central Ontario, and at a number of localities east and north-west of Lake Superior. Other deposits have been found in the northern part of British Columbia at Granby Bay, and near Port Essington, on the Skeena River. Deposits of pyrrhotite, a closely-related mineral, containing, when pure, about thirty-nine per cent. of sulphur, also occur, in New Brunswick, in Quebec, and in Ontario.

In Ontario, several mines are producing ore. There are numerous pyrites prospects, not only in the Province of Ontario, but also in the western provinces, which, in the future, will afford valuable sources of sulphur.

The largest, and at present the only, producing salt district, is situated in the south-western peninsula of the Province of Ontario, bordering on Lake Huron, the St. Clair River, Lake St. Clair, and the Detroit River. The salt is obtained from the evaporation of salt brines, either natural, or formed by pumping water down to the salt beds.

Extensive beds of salt, or salt-producing springs, are found in nearly every province, but there has been no serious attempt at commercial production outside Ontario.

In the following table is shown a record of the mineral production of Canada during the calendar year 1915:—

Product	Quantity	Value
Metallic *		
Antimony.....lbs.	961,040	\$ 192,208
Cobalt, metallic....."	211,610	
Cobalt, oxide....."	379,219	502,388
Nickel, metallic....."	55,325	
Nickel, oxide....."	200,032	42,193
Copper, valued at 17.275c per pound....."	102,612,486	17,726,307
Gold.....ozs.	916,076	18,936,971
Iron, pig from Canadian ore.....†tons	158,598	1,740,808
Iron-ore sold for export....."	93,444	187,682
Lead, valued at 5.60c per pound.....lbs.	45,377,065	2,541,116
Molybdenite....."	28,600	28,460
Nickel, valued at 30c per pound....."	68,077,828	20,423,348
Silver, valued at 49.60c per oz.....ozs.	28,401,735	14,088,397
Zinc ore.....tons	15,553	636,204
Total.....		\$77,046,082

*Note: The metals, copper, gold, silver, lead, nickel, are valued at the full value of the refined metal in a recognized market, whether the actual refining is done in Canada or not.

†Tons of 2,000 pounds.

Product	Quantity	Value
Non-Metallic		
Actinolite.	tons 220	\$ 2,420
Arsenic, white	" 2,291	141,830
Asbestos.	" 113,115	3,491,450
Asbestic.	" 25,700	21,819
Chromite.	" 14,291	208,718
Coal.	" 13,209,371	31,957,757
Corundum.	" 262	33,138
Feldspar.	" 15,455	59,124
Graphite.	" 2,610	121,023
Grindstones.	" 2,580	35,768
Gypsum.	" 470,335	849,928
Magnesite.	" 14,779	126,535
Manganese	" 47	5,460
Mica.	"	81,021
Mineral pigments—		
Barytes.	" 550	6,875
Ochres.	" 6,248	48,353
Mineral water		118,796
Natural gas	M. cu. ft. 18,319,710	3,300,825
Petroleum, valued at \$1.395 per bbl.	bbls. 215,464	330,572
Phosphates	tons 217	2,502
Pyrites.	" 296,910	1,028,678
Quartz.	" 127,108	205,153
Salt.	" 119,900	600,226
Talc.	" 11,885	40,554
Tripolite.	" 317	12,119
Total.		\$42,801,694

Structural Materials and Clay Products

Cement, Portland	bbls. 5,681,032	\$ 6,977,024
Clay products:—		
Brick, common, pressed, and paving.		2,341,483
Sewer pipe		795,646
Fire clay, drain tile, pottery, etc.		781,071
Kaolin.	tons 1,300	13,000
Lime.	bush. 4,932,767	1,015,878
Sand and gravel.		2,098,683
Sand-lime brick	No. 23,211,802	182,651
Slate.	sq. 397	2,039
Stone:—		
Granite.		1,634,084
Limestone.		2,504,731
Marble and sandstone.		365,784
Total structural materials and clay products.		\$18,712,074
All other non-metallic.		42,801,694
Total value, metallic.		77,046,082

Grand total, 1915. \$138,559,850

The future development of the mineral industry will undoubtedly go hand-in-hand with the growth of population, the opening up of new districts for settlement, and as a natural corollary additional railway construction or the provision of other satisfactory means of transportation to serve the needs of such districts. Many of our present most important ore deposits have been actually discovered as a result of railway building. The Sudbury nickel-copper deposits and the Cobalt silver ores, were both discovered in this way. The wonderful Porcupine gold district of Ontario, too, is largely indebted for its prosperity to the building of the Temiskaming and Northern Ontario Railway, constructed by the Government of the province.

The extension of the Grand Trunk Pacific, and the Canadian Northern is opening up a wide extent of territory, both in Ontario and in British Columbia.

Sir Richard McBride—for thirteen years Prime Minister of British Columbia—in a recent address in Victoria, the capital of that province, said:—

“In looking into the future, there is nothing to discourage, there is everything to encourage. A point that struck me particularly, having travelled a great deal over the province, was the difference in making the journeys, and the trips that we will all be able to make in a short time. I believe from my own knowledge of the country the new railways pass through—and I do not think there is any question but what these railways, especially the Grand Trunk Pacific, the Canadian Northern, and the Pacific Great Eastern, will assist materially—that it will not be many years before you will find northern British Columbia competing successfully with southern British Columbia in regard to the products from the mines that will be turned to profitable account, most likely within the next two or three years. Some of these mines are to-day commencing to ship ore, while others are being developed to the shipping stage, and I am satisfied that their future will be very gratifying to us all.”

Particularly on account of the analogous character of the rock structures and geological formations in the two countries, the development of the highly-organized mineral industry in the United States, where the value of the annual output

now exceeds two billion dollars, is the best object-lesson that can be presented of the future possibilities of the mineral industry in Canada.

The war has demonstrated, in no uncertain way—not only from the national point of view, but also from the industrial standpoint—and statistics go to prove that industrial expansion on well-organized lines carries with it sound investment returns—the desirability of as far as possible producing within the Empire all those products essential to the carrying on of industry. To this end steps are already being taken to stimulate and encourage the smelting and refining industries of the Dominion.

In April, 1916, Sir Thomas White, Minister of Finance, introduced in the House of Commons a resolution—which was duly passed—under which, and subject to certain conditions on the termination of the war, the Dominion Government will assist by way of a generous bounty, the zinc industry. With this timely assistance a considerable increase in the output of zinc spelter may be looked for.

PUBLIC TRUSTEES AND EXECUTORS

CANADIAN TRUST COMPANIES AND THEIR FUTURE

BY ALBERT E. HOLT*

I do not here purpose to go into the many details of the business done by the Canadian trust companies, but merely to indicate the situation in a general way. What I have to say is, I believe, more or less known in business circles in Canada but, in addition to those at home, many readers abroad, including those who have made investments through a Canadian trust company, or have securities in its hands for safe custody and collection of dividends, will doubtless be interested.

Figures in an article of this kind are apt to be wearisome, and I therefore do not purpose to give any beyond the mere statement that the total of the balance sheets of Canadian trust companies reporting to the government of the province of Ontario, as shown by the Government Report for the year 1914, amounts to \$335,636,893. Almost all the companies of any size have either head offices or branches in the Province of Ontario, and consequently must lodge with the Provincial Government periodical statements of all their business. These figures are exclusive of securities held merely for safe custody and collection of interest, which may be estimated at something between fifty and a hundred millions, and of bond trusteeships, which, of course, run into hundreds of millions of dollars.

It is only of recent years, in fact, since the beginning of the present century, that trust companies in Canada have

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attained to any considerable growth. While several companies had been established for a number of years previously, and were doing a profitable business, the establishment of trust companies had not spread to any great extent throughout the Dominion.

Canadian trust companies have not been operated upon the same lines as has been customary in the larger cities of the United States, where the trust companies have, in many cases, been practically bankers, as well as trustees, so far as their relations with the general public have been concerned.

The Canadian companies have never done banking business, or entered into competition with the Canadian banks. There are cases where deposits are accepted subject to cheque, but the practice does not prevail to a sufficient extent to incommode or antagonize the banks.

Trust company officials, by reason of their business, must become experienced in various legal questions which continually arise in connection with the management of estates and of various kinds of trusteeships, and are consequently able to deal with them without finding it necessary constantly to take legal advice; but, notwithstanding this, the business is so intricate, and so many new points arise, that probably no other class of business in Canada gives rise to more difficult questions being propounded for legal opinion.

The laws relating to business transactions are sometimes based upon old codes, compiled long before any anticipation of modern business conditions was possible, and when, by reason of such conditions, points arise for which there is no precedent, the advice of responsible lawyers must be sought in order to avoid the possibility of litigation at some future time.

One of the difficulties which confronts the executive of Canadian trust companies is the lack of available trained staff to cope with the requirements of a growing business. As the successful trust companies have all grown considerably during the past ten years, and have consequently found it necessary to enlarge their staffs, there is no surplus of trained labour in this profession. It is much more difficult to train a trust company clerk to a satisfactory point than is the case in almost any other business, as trust companies have to deal

with many changing conditions from day to day, and with the peculiarities of co-executors, heirs, and beneficiaries, with whom the company may become involved in business relations by no choice of its own. Hence it will be easily seen that diplomacy is by no means the least attribute necessary in the make-up of a trust company's official.

The war also accentuated the difficulties in the way of securing efficient staff, many of the young men in the employ of the various trust companies having volunteered for active service abroad. It was said recently by a prominent trust company official in the United States, that his company considered ten years' training in the business necessary before any employee became satisfactorily efficient, and this sentiment would probably be echoed by trust company executives in Canada.

The accuracy of the clerical work done by the Canadian trust companies compares, in my opinion, very favourably with that of any other business. The responsible companies all bear heavy expenses for auditing and checking. I doubt if it is any exaggeration to say that one-quarter of the staffs of the various companies could be dispensed with, if such care in checking were not exercised as is actually the case. In spite of all precautions, however, clerical errors will occasionally creep in, but the record of the best Canadian companies seems to show that the service rendered by them is remarkably accurate.

For a long time the use of the words "Trust", or "Trust Company", by irresponsible concerns was not forbidden to any extent by the Legislatures in Canada, but steps have now been taken, both by the Dominion and by some of the provinces, to remedy this evil. Even the new legislation, however, which has been passed on this point, has not always provided for the discontinuance of the use of the name by concerns which were already using it before the passing of the Act, and consequently it is very important for any person who contemplates doing business with a Canadian trust company to enquire carefully into its standing.

The number of really high-class companies is quite limited. Unfortunately, there are many irresponsible concerns still using the name in some form or other.

The sounding of a note of warning will not, I think, be out of place here. A vast amount of money has been sunk—particularly in the West—by investment, or speculation, in unsound securities, in some cases from a lack of knowledge of values and local conditions; in others by investing with, or through, concerns or individuals whose chief interest was the profit coming to themselves.

As the better class of Canadian trust companies make no promotions, and do not undertake speculative transactions or business involving risks, it naturally follows that their profits must be limited to legitimate fees and commissions, and consequently no exorbitant profits are made by them. A company in western Canada, which has recently come to grief, with most disastrous results to its clients and shareholders, had been arousing distrust for some time in conservative circles by the large profits shown in its published statements. It was considered, by those familiar with what legitimate profits should be, that the company in question was either publishing false statements, or indulging in wild but successful gambling. When the crash came, it was found that the enormous profits had never been made, except on paper. Legitimate business, on the other hand, while not greatly profitable in small quantities, should increase like a snow-ball, rolling along and growing as it progresses.

It is usually sufficient for one member of a family to have business transactions with a trust company to cause him to decide to place in its hands such trust matters as may be in his control, and to recommend his relations and friends to do the same. Gradually it is found that the family often look to the trust company for advice and assistance in their business affairs, and while the trust company is not supposed to be a philanthropic institution, but expects to make some profit on all the business it does, the fees are sufficiently small as not to frighten anyone away. Consequently, the new business which continually comes in, amounts, in the aggregate, to something very considerable and correspondingly profitable.

A wise company is always adaptable to the varying requirements of its individual clients, and very often, indeed, such action tends to an increase of business relations.

The best Canadian trust companies do not buy and sell securities, except on commission. They are entirely distinct from the bond houses, which carry on a business of buying municipal and other bonds en bloc, or wholesale, and reselling or retailing them in small parcels. The trust company, on the other hand, should have no more interest in one security than another, in other words, it should have no axe to grind in its recommendations, and its advice should be, and, I believe, as far as the foremost Canadian companies are concerned, is, quite disinterested. All that such a company should sell is service.

The business which is entrusted to trust companies is, of course, considered strictly confidential, and I am not aware of any case where a Canadian company has betrayed the confidence entrusted to it, or where any information has leaked out to the detriment of a client.

In some respects the company's work is very similar to that of a lawyer or a doctor. It is admitted to the most intimate family secrets, and has to exercise constant discretion in dealing with most confidential matters.

One question, which continually arises, is whether or not it is advisable, in a case of executorship and trusteeship, to appoint the trust company as sole executor and trustee, or to join with it some friend, or member, or members of the family. This must in every case become finally a matter of individual opinion; but after long experience I have come to the conclusion that, on a general basis, the interests of an estate, and its beneficiaries, are best served by leaving the trust company in full control.

The fees of a company are usually the same, whether it acts alone or jointly with other parties, although the appointment of co-executors and co-trustees, of course, relieves the company of a certain amount of responsibility. The opinion I express here is based solely upon my experience of actual results in cash in cases where a company acts alone and unhampered, and in other cases where there are several executors or trustees, varying in intelligence, business experience, and disposition. There may be exceptional cases where it may be advisable to have joint control, but I am convinced that, as a general rule, the opinion I now express is correct.

The possibilities for the future of some of the Canadian companies is almost unlimited, the scope of the business being so wide as to include many branches of human activity. The tendency of the day appears to be towards tying up assets in such a way as to insure their being held for the benefit of a man's descendants as long as is legally possible. While transfer agencies, registrarships, bond trusteeships, escrow trusteeships, etc., are all legitimate and profitable business, the main branch of a growing and successful Canadian company will probably be its family and estate business.

When a company has business connections with a family, it considers it its duty to place at the disposal of that family all the advice and assistance in its power. Children are properly cared for, and their education supervised, if necessary; marriage settlements arranged in due course; assistance given in the most intimate family affairs, as well as in business dealings throughout a lifetime, at the end of which the company is sometimes called upon to take charge of the funeral arrangements.

It is the policy of some companies, and I consider it a very proper one, to continue to carry on the affairs of a deceased person for whom the company is acting as executor, with as little disturbance as possible to his personal relations with agents, or professional men whom he, or she, had been in the habit of employing. The lawyers, notaries, agents, etc., of the deceased are continued to be employed, as far as possible, in connection with his affairs.

There is infinite variety in the work of a trust company, as it acts as executor and trustee for persons in all kinds of trades and professions, whose various business affairs are carried on or wound up, as the case may be.

One of the difficult features of the trust business is that the company is continually defending the interests of the dead against the living, and of persons unknown to the company against those who have appointed and are paying it. It is essential from the company's point of view that the intentions of a dead testator, who has entrusted his estate to their hands, should be carefully and scrupulously carried out. Sometimes such intentions are not very agreeable to the heirs, but no company, which expected and hoped to continue to

receive the confidence of the public, could allow the intentions of the deceased person to be set aside at the desire of the living heirs, merely in order to obtain, or retain, their goodwill.

Where a trust company is acting as trustee for a bond issue under a trust deed, it is appointed and paid by the company issuing the bonds, but represents the bondholders, who are in many cases utterly unknown to it. The duty of the trustee in such cases is to enforce strictly the conditions of the trust deed against its known client, if necessary, on behalf and in the interests of people with whom it may have had no communication. Cases may arise where it may possibly be unaware of the address of a single bondholder. Industrial companies are very apt to execute trust deeds, securing bond issues, without sufficient consideration of the covenants which they undertake to fulfil. The deed is executed, the bonds are issued, and shortly afterwards the industrial company finds that under the deed it is expected to do something which it finds extremely inconvenient. It promptly proposes to the trustee to waive certain conditions of the deed, or otherwise attempts to evade them, thus placing the trustee in a very delicate position. In such circumstances the trust companies consider themselves bound to enforce the conditions of the deed without fear or favour; and it is very seldom, indeed, that a large trust company is free from discussions, and even disputes, arising either from the attempts of living beneficiaries under a will to set aside the intentions of the testator, or from the desires of companies, for whose bonds the trust company is acting as trustee, to vary or evade some obligation which it has light-heartedly incurred in the deed of trust.

While the branch office system is in effect to some extent, its value, except in the larger centres of population, still remains to be proved. Small towns and villages have little business to offer to a trust company, and while the companies require to have sufficient agents and connections to protect the interests of their clients, there is no great advantage to be derived from the establishment of branch offices outside the Dominion. Up to the outbreak of the war, sufficient money was offering from individuals and syndicates abroad,

direct to the home offices of the Canadian companies, for investment purposes in Canada, as to render it unnecessary for the companies to establish offices in foreign countries with a view to obtaining business there. Most of the prominent companies, however, have agents or connections abroad, which enables them to stretch out a long arm for the protection of clients in other parts of the world.

Some of the Canadian trust companies, in addition to fulfilling the duties of executors and trustees, act as investment agents for corporations, syndicates, and individuals, and in this capacity have assisted considerably in the development of western Canada by finding moneys for farm loans. For many years these loans proved a most satisfactory form of investment, being safe and yielding good returns. It naturally follows that great care must be exercised regarding the security and its value.

There is still a great deal of splendid land in the north-western provinces awaiting cultivation. A much larger population than we have at present could easily be self-sustaining. When the war is over, and the burden of taxes in all the European countries, which have participated in it, is pressing down upon their congested populations, there is reasonable ground to expect a rush of immigrants to this favoured land, where steady industry is assured of its reward. This is no country for the tramp, the idler, or the lazy incompetent, and there are parts of the cultivated areas where the present shiftless farmers must be replaced by steadier and more intelligent men, who will be ambitious to do what is right and proper to the ground, and who will in return be entitled to expect ample compensation in its increasing yield.

I look forward to the time when the development of our natural resources will afford sustenance to numberless industries operated by a people strong in numbers and power, of high national and individual character and ideals, bound up by ties of kinship, affection, and mutual advantage.

THE FUTURE OF THE LIVE STOCK INDUSTRY

BY H. S. ARKELL, M.A., B.S.A.*

Few realize the industrial importance of land and rural occupations in their relation to the social and commercial development of a nation. An elaborate interpretation of this relation is, of course, not in keeping with the purpose of this article, but the economy of agricultural and live stock production, in its bearing upon national progress, can, perhaps, best be explained by reference to certain aggregates of values which will serve as a basis of comparison between a few of our most important industries. It is officially reported that, in the fall of 1913, the farmers of the Province of Ontario had deposits in the savings banks to the amount of \$100,000,000. For 1914, the estimated value of farm crops in Canada aggregated \$638,580,300, and of live stock, \$725,530,000. Apart altogether from the worth of the land, the estimated value of farm crops and live stock aggregated the immense total of \$1,364,110,300.

Turning now to a consideration of other industries, we find that according to census returns the total capital invested, in 1910, in manufactures, amounted to \$1,247,583,609, and the total value of its products to \$1,165,975,639. As compared with the savings of Ontario farmers, we may note that the total of salaries and wages paid to employees of manufacturers in all Canada, in 1910, amounted to \$241,008,416. Our financial institutions, which may be considered as adequately represented by the chartered banks, have a total paid-up capital of \$114,759,807. The total mineral produc-

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tion for 1914 was valued at \$128,475,499. The total gross earnings of the railways aggregated, in 1914, \$243,083,539.

The statistics just quoted suggest the value of the asset, real and potential, to Canada of her rural industries. It will be recalled that, when at the outbreak of the war, the whole credit system of the world was disorganized and disrupted, the statesmen and financiers of the country turned with a confident appeal to agriculture to re-adjust the adverse balance of trade which then existed against Canada. Sir Thomas White (then the Hon. W. T. White), Minister of Finance, called attention to the embarrassing position in which the credit of the Dominion was involved, consequent upon the fact that we have been obliged to borrow in order to finance our productive activities. He quoted statistics to the effect that the balance of trade against Canada, or, in other words, the excess of imports over exports, amounted, in 1912, to \$225,000,000; in 1913, to \$300,000,000, and in 1914, to \$180,000,000. Hitherto we have corrected this adverse balance by borrowing from Britain, or, in other words, we have paid our debts by adding to our loans. We have bought more than we have sold, but, as our capital resources have so increased as to warrant it, we have paid by consolidating the debt. The financial crisis resulting from the war faced the country with the payment of this debt. Sir Thomas White appealed to agriculture to save our national credit.

How agriculture played its part in answering that appeal may be gathered from the statistics of imports and exports for the first five months following the outbreak of the war. During that period the exports aggregated \$189,256,485. Of this amount, \$9,671,628 was furnished by fisheries; \$20,276,595 by the forest; \$22,339,018 by the mines; \$31,507,433 by manufactures; \$41,153,615 by animal produce; \$63,993,681 by agricultural produce; or a total for agriculture of \$105,147,296, this being the equivalent of 55 per cent. of the exports of all commodities for the period. Nor is this an isolated instance where the record for agriculture, as compared with its rival industries, evidences its pre-eminent position in the commerce of the country. For the nine months ending December 31st, 1914, the export of animal and agricultural produce constituted 53 per cent. of our total export

trade for that period; for the fiscal year, 1913-14, it constituted 58 per cent.; for the fiscal year, 1912-13, 54 per cent., and for the fiscal year, 1911-12, 53 per cent. For the last month of the calendar year 1914, total exports exceeded total imports by \$5,738,726. In that month the goal was achieved, in that the balance of trade was placed on the right side of the ledger.

The total exports from Canada, domestic products, not including gold and bullion, for eight months to August 31st, 1915, amounted to	\$ 302,858,210
The total imports for home consumption, not including gold and bullion, for eight months to August 31st, 1915, amounted to	282,186,650
The balance of trade in favour of Canada, therefore, for the period given amounted to	\$ 20,671,560

Perhaps at no time in the history of Canada has the attention of prominent public and business men been so appreciatively directed to agriculture as is the case to-day. Financial depression has clogged the wheels of industry and restricted commercial development. The war has disrupted credit and created an unprecedented demand for foodstuffs. The Empire's need has illustrated—and brought into remarkable relief—the stability and fundamental importance of our rural industries. Statesmen and financiers have recognized that our agriculture is an asset which steadies and maintains the country's credit. The transportation and carrying companies have learned that they need the business which trade in the produce of the farm develops. Middlemen admit that theirs is a service, the success of which is dependent upon the permanent well-being and business advancement of the man on the land. Manufacturers are finding it to their advantage to take counsel with the organized enterprises of farmers. The Parliaments of Canada, Federal and Provincial, are beginning to sense the smouldering power and influence of the agrarian interests. In a word, the most important single feature of our national economy, as significant of the future of agriculture in this country, is the business and commercial recognition which the industry has achieved almost within the last few months. The Bill of Rights taught the people of Britain that the sovereign power of the Kingdom lay

within their own hands. The European war is teaching the farmers of Canada that the heritage of the Dominion is their natural birthright. Who shall say to what end that truth leads?

The young men of rural Canada are fortunate in having at their hand the advantages of one of the most complete and practical systems of agricultural education in the world. It is now freely recognized that when, in association with common sense, technical and experimental information is brought to bear upon the problems incident to the management of a farm, the owner soon finds himself in a position to become master of his work. The Dominion is equipped with agricultural institutions and experimental stations of which, serving, as they do, the needs of every province, she has reason to be proud. In the courses and experiments, science and practice have been so combined as to equip the student thoroughly and efficiently for his future work. Governments have been lavish, but not too lavish, in their expenditures in this direction, and perhaps no more popular justification for any progressive measure is to be found than in the endorsement given by the students themselves and by the public generally, to the development of agricultural education. Unquestionably, all forward movement is given substance and rendered possible through the operation of the forces which are brought into being as science; and the teaching of experimentation, and the principles of social and rural economy, touch the personality of the farmer and the problems of the farm.

There is one field in the exploitation of which agriculture has had as yet but very limited experience. I refer to the organization of the producer, and rural co-operation in the sale of the products of the field and feed lot. A movement in this direction represents a potential force, making for progress and power in his interests, the value and magnitude of which the agriculturist, collectively, has only partially recognized and indifferently achieved. A prominent business man said to me recently, "What can the producer expect? What can the consumer expect? Neither the one nor the other is organized. Between them is the middleman. His business represents the best brains the country can de-

velop, and the best organization that such brains can create. The producer and consumer are individuals; they sell as individuals; they buy as individuals. When there are advantages to be gained, who is to gain them? When there are to be profits to be reaped, who is to reap them? Certainly the problems incident to supply and demand restrain and control our activities; the law and the government, and perhaps competition, restrict our opportunities; but to-day the individual cannot expect to compete successfully with organized business." That is the situation in a nutshell.

In Canada, at the present time, the farmer knows how, or he can find out. Agricultural education surrounds him with information and demonstration. Experimental stations advise him regarding methods and practice. His productive activities are, or may be, intelligently directed. His selling operations are uneconomic, wasteful, and out-of-date. In the marketing of his goods is to be found the great leak in his own and his neighbours' business. In the creation of a marketing system, commensurate with the commercial genius of the age, lies the way of progress.

Let me give one illustration! In 1912, the Live Stock Branch of the Federal Department of Agriculture became convinced that the only argument which would be indisputably credited as to the utility of a movement in this direction must consist in a thorough-going demonstration of the practicability of a co-operative system of marketing. For reasons which need not here be detailed, it was decided that the egg and poultry industry offered the most attractive and seasonable opportunity for the purpose contemplated. By arrangement, the chief of the Poultry Division went to Prince Edward Island to investigate conditions in that province. He found that the farmers had practically no market for their eggs, other than that which they could secure in the way of trade at the country store. Competitive traffic in the product appeared to be unknown. Neither buyer nor seller realized much profit from the business. There existed no incentive to improvement. The poultry industry, in short, needed systematic re-organization, were it to prove the commercial asset to the province which was clearly warranted by the natural adaptability of the Island for poultry-keeping.

At one of the meetings held a loop-hole for progressive work was offered, and a recommendation was immediately made that the movement be initiated on Prince Edward Island. A capable man was secured to direct the campaign, and he was instructed to foster the egg circle propaganda as the basis of his work. The result of his efforts, and the success of the movement, is apparent in the report of the annual meeting of the Prince Edward Island Egg and Poultry Association held in Charlottetown, in April, 1915. The business statement follows:—

Business done by Prince Edward Island Egg Circles, January 1st, 1914, to March 31st, 1915

No. dozens collected by 42 circles	921,264.4
No. dozens estimated by 19 circles	289,645.
Total dozens collected by 61 circles	1,210,909.4
Gross value of all eggs collected	\$ 279,114.60
Net value of all eggs collected	266,400.06
Average cost per dozen of collecting	1-1/20c
Average net price per dozen paid members	22c

The Hon. Murdock McKinnon, Commissioner of Agriculture for the province, expressed the conviction that the meeting of the association was the most enthusiastic farmers' convention ever held in Charlottetown. He stated that the best farmers of the Island attended, the circles having chosen their best men as delegates. They had come for a purpose. They knew their business. They accomplished what they came to do.

*“The principle underlying the formation of the egg circles is that the farmers of the Island shall have the opportunity to reap the just returns of their labour. They are intended, and will act as a stimulus to the keeping of better strains of poultry, and increased production, due to proper care.

“Another very tangible result is the popularization of the Island eggs in the Boston and Montreal markets, especially since the establishment of candling stations, whereas previously they had a poor reputation on those markets. Transportation companies are investigating the business very carefully, and are looking forward to the carrying of the eggs. Bankers on the Island are also giving a great deal of attention to the financial side of the undertaking, and considering

* Press Reports of the Convention.

carefully how great are the prospects. Such interest augurs well for the solidity of the business. The farmers of the Island are required to make a further effort to gain full and undisputed possession of the heritage opened to them, and it is expected that they will be fully able to consolidate this great undertaking, and set an example of successful co-operation, not only to those within, but also to those without, the bounds of our fair Dominion.

"The Live Stock Branch, through its representative, undertook the difficult task of organizing the farmers of this province into egg circles, with a view to secure for them the highest prices for eggs that the available markets could afford. The work succeeded beyond their most sanguine hopes. Some five thousand farmers were enrolled. The business of marketing their eggs was established, and in convention this week, through their delegates, they publicly placed the stamp of their appreciation of the work in a resolution, which was supported by perhaps the strongest speeches ever heard in any convention in the province."

One great fact the reporters have missed, and the convention has failed to recognize. The people have done this work themselves. It has been their own fight. They are winning their own victory. Were it possible to tell the whole story, this statement would be more fully vindicated. Assistance and counsel and direction they have received, but in the face of discouragement and unmerited opposition, they are building firmly the foundation of a permanent business institution, which has its significance for all Canada in the development of the live stock industry.

In this direction, let me repeat, lies the way of progress. It is becoming evident that in the production of live stock consists the safeguard of Canadian agriculture, and the steadying factor in the maintenance of Canadian business. A prominent merchant said to me the other day, "Conservative bankers in the United States are beginning to realize that cattle paper is the best collateral that they can get." Banks in Canada cannot legally loan money on live stock. Transportation companies admit that without live stock business their profits disappear. They acknowledge that had they fostered the rearing of cattle, hogs, and sheep years ago,

they would be reaping the benefits to-day. The leaders of finance and commerce in the Dominion Parliament now know that the permanent support of the country's credit lies in the extension of live stock production, and in the immense resource which the Dominion affords for such development. Agricultural educators and practical agriculturists, no matter what their predilections or prejudices may be, deliberately affirm that the soil is an asset only as it is itself fed, that the product of the soil must be converted into live stock before it leaves the farm, and that without diversified farming, Canadian agriculture cannot succeed. In the argument, wheat vs. live stock, as an export commodity, let it be remembered that, in the year 1913-14, Russia produced 934,927,000 bushels, as against 231,721,000 bushels by Canada; that—on account of cheaper labour—Russia can grow wheat 20 per cent. cheaper than can Canada; that Russia's great rivers flow south into navigable waters, while Canada's flow north into a frozen ocean. As a direct result of this fact, Russia can deliver her wheat on the British market at a 20 per cent. lower cost for carriage than can Canada. It is not now intelligently contended that the policy of *unduly* extending the growing of grain for export purposes is economically sound, or practically desirable.

What, then, are the resources of the Dominion with respect to the rearing and maintenance of live stock? Canada's actual status in this regard may be gleaned from the following tables:—

NUMBERS OF LIVE STOCK IN VARIOUS COUNTRIES, WITH
STATISTICS OF AREA AND POPULATION

	Area Sq. Mls.	Population	Cattle	Sheep	Swine
Canada	*3,729,665	*7,206,643	†6,036,817	†2,058,045	†3,434,261
Australia ...	*3,063,041	*4,872,023	*11,493,167	*85,046,724	*800,367
New Zealand.	*103,860	*1,084,662	*2,020,171	*24,191,810	*348,754
United States	*3,026,789	*91,972,266	†56,592,000	†49,719,000	†58,933,000
Argentina ...	*1,131,841	*7,123,663	†28,786,168	†80,401,486	†2,900,000
United Kingdom ..	*120,651	*45,370,000	*11,963,600	*27,629,206	*3,305,771
Belgium	*11,373	*7,516,730	*1,879,754	*185,373	*1,494,297
France	*207,076	*39,601,509	†14,705,900	†16,467,700	†6,903,750
Denmark	*15,042	*2,757,076	*1,281,974	*726,879	*1,467,822
Russia	*1,862,524	*122,550,700	*48,896,000	*74,066,000	*13,508,000
Germany	*208,780	*64,925,993	†20,182,021	†5,803,445	†21,923,707

* Whitaker's Almanac, 1915.

† War Book.

‡ Statistique Agricole.

CANADA'S FUTURE

LIVE STOCK PER UNIT AREA AND POPULATION
VARIOUS COUNTRIES

	Cattle		Sheep		Swine	
	Per Sq. Mile	Per Capita	Per Sq. Mile	Per Capita	Per Sq. Mile	Per Capita
Canada	1.618	.837	.551	.285	.920	.476
Australia	3.75	2.35	27.765	17.456	.261	.164
New Zealand	19.450	1.862	232.927	22.303	3.357	.321
United States	18.697	.615	16.42	.540	19.47	.640
Argentina	25.433	4.040	71.036	11.286	2.562	.406
United Kingdom ...	99.158	.263	229.	.608	27.391	.072
Belgium	165.282	.250	16.299	.0259	131.389	.198
France	71.016	.371	79.524	.415	38.339	.174
Denmark	85.226	.464	48.323	.263	97.581	.532
Russia	26.252	.398	39.766	.604	7.252	.110
Germany	96.187	.310	27.796	.089	105.008	.337

Canada's remarkable position, revealed by these tables, as the country with the largest area, and the smallest number of cattle and sheep, and, with but one exception, the smallest number of swine per square mile, is particularly significant in respect to the possibility of future growth. It is scarcely necessary, in the light of the figures given, to emphasize the comparative insignificance of Canada's live stock population in its relation to the area of the country. Per unit area, Australia has twice as many cattle; Argentina, fifteen times as many; Belgium, one hundred times as many. The United States has thirty times as many sheep; the Argentina, one hundred and forty times as many, and the United Kingdom two hundred and fifty times as many. The Argentina has three times as many swine; Denmark, one hundred times as many, and Belgium one hundred and forty times as many. All these comparisons are per unit area.

As regards the status of the country, with respect to live stock per capita, the primary significance of the fact that she stands relatively high in this regard is indicative of her opportunity to develop an export trade. The more cattle she has per capita, the more she can afford to export. Could Canada approximate, by regular increases, the number of live stock other countries have per mile, her position as an exporting country would be assured. Can this be done? This question immediately suggests the adaptability of Canada for live stock production, and the disposition of the people to undertake it. A country that can produce grass and clover and roots and corn; a country that is blessed with reasonable rainfall, and has abundant sources of pure running water; a country that enjoys the luxury of the seasons in which the

rigour of winter is tempered by the warmth of summer; a country that generously responds to the husbandman's toil—such a country can produce cattle—such a country is Canada. Moreover, our people are of a race with which live stock husbandry is an instinctive occupation, and we have reached a period when the pendulum of rural activity, after swinging away from live stock production for several years, is on the point of return. That return should carry us far. Prince Edward Island, with its minimum of waste land, is already tasting the fruits of progress. We ought soon to see crowding back upon the hills, and into the valleys of Nova Scotia and New Brunswick—with their wealth of grass, and fertile soil—the cattle, and sheep, and hogs, which would multiply the homes and rejuvenate the industry in those provinces. Quebec has resources still untouched. Following the war, a great forward movement should be expected amongst our French-Canadian farmers. Ontario is peopled by a conservative race, but the opening of the great new land to the north, the rapid development of the urban population, and the influence of the press, and of our educational institutions, is creating new vision, is developing intensive husbandry, and is opening wider markets at her own doors.

It is with the western provinces, however, that the most promising opportunity lies. The grain-growing sections, south of the main lines of the three transcontinental railways, are already turning their attention to mixed farming. The possession of cattle safeguards the farmer against the ravages of weeds, and against the uncertainty of price or yield. Methods in this area are in a transitory stage; but, if conditions favour, the farmers may be induced to turn their attention permanently in the direction of the keeping of live stock.

Then away to the north, in all three provinces, lies the "Park Belt." This is purely a stockman's country. Grass and the wild vetch and peavine grow luxuriantly. There is good shelter and easy access to plenty of water. Hay and fodder can be grown and put up for winter feeding. The soil is deep and fertile, and yields an abundance of rough feed. Rainfall is dependable. Given proper facilities with a stable market, this area alone will raise as much live stock as is now produced in all Canada.

British Columbia also is seriously considering the merits of live stock husbandry. The cities and the development work in the north furnish a steady market. People are finding that the returns from this industry are to be relied upon. In both the cultivated areas and the ranching districts, increase in the stock of cattle is possible. The tendency in this direction is uniform throughout Canada. Farmers, generally, are satisfied that profitable markets exist. There is, however, hesitation everywhere, because they know that, through lack of adequate marketing facilities, there is no security afforded them that they will receive the legitimate profits due their business.

I shall not attempt an analysis of the market situation, that being a study apart. The present high cost of living is an argument in itself, and carries its own suggestion. In ten years, the population of Canada increased 34.1%, while the cattle population increased only 17.1%. In that period, moreover, the urban population increased by 62.2%, while the rural population increased by only 17.2%. To make the ratio per total population for 1911 equivalent to that for 1901 would require 907,547 additional cattle, or more than five times as many as were exported in 1901. The great consuming market of the United States, where a somewhat similar situation exists, has recently thrown wide its gates to the entry of Canadian live stock, and our products have already found a profitable outlet there, particularly in the large cities of the eastern coast. The war in Europe has created a situation, the influence of which must bear upon our outlook for several years to come. Already we are exporting immense quantities of bacon and pork products. Could we get tonnage we could send, following enquiries already received, like quantities of beef. In the case of lamb and mutton, no supplies are available here. In a word, Canada is convinced that a profitable market is permanently assured were she in a position to take advantage of it.

Where, then, is the difficulty? It has already been suggested. The farmers have no confidence in the situation which faces them. They have repeatedly been discouraged by adverse fluctuations in price. They fear manipulation of the market on the part of the middleman. They have no

faith in the avenues of trade, through which they are obliged to do their business. Experience has satisfied them that the less they risk, the less they will have to lose. The farmer is no coward, but he also is no fool. He knows that new bridges are being built; he is even building them himself, but he prefers to see them tested before trusting his goods upon them. Until then, he purposes to deliver his usual quota only. If we believe his experience, who shall challenge his judgment?

In conclusion, it must be very frankly stated that what we need is the perfection of a marketing system. This is the bridge to be built, and tested. This is the new trail to be blazed. Or, better still, this is the new terminal to be built, which shall complete the great avenues of agricultural trade, and bridge the gulf between producer and consumer in a manner that, while providing for legitimate trade profits, shall permanently safeguard and consolidate the business interests of the farmer and breeder. Until this is accomplished, the development of our live stock industry will be regretfully delayed.

This the country cannot afford to permit. An increase of 20% in our product would add millions to our national credit. Our statesmen affirm that this is almost our greatest need. Packing-houses and railway companies need the business. Banks and bankers are seriously discussing the possibilities of agricultural development in strengthening national finance. The markets of the world offer Canada a place among the nations. The resources of our Dominion are an asset upon which we ought now to realize. Our Canadian farmers, east and west, are prepared, as never before, to turn their energies, their abilities, and their capital, to the production of live stock. They hesitate, and will hesitate, until their confidence is restored in the channels of trade. This confidence must be restored. The time is ripe for the unification of the important business interests of the Dominion. It may now be possible to create a permanent reciprocity between finance, transportation, manufacture, trade, and agriculture, in consideration of the great national issues affecting our commercial advancement. An opportunity awaits the government of the day.

THE EDUCATIONAL FACILITIES OF CANADA

PRESIDENT R. A. FALCONER, C.M.G., LL.D., D.Litt.*

Canada has been suddenly thrust upon the attention of the world. For some years now it has been known that her natural resources are almost limitless. The war has proved once again that her people are virile. These facts appeal to intending immigrants. The more intelligent they are, and, therefore, the more desirable for the country to secure, the more will they consider, before making a final choice of their future home, what are the opportunities the country offers for the education of their children, and what grade of intelligence the people possess, as shown by their interest in education. Will their children have a chance equal to that they have left, or at least to fit them for taking their part in an intelligent community? Is the atmosphere of the country such that a family can enjoy the advantages of genuine culture? Will the average man have well-educated neighbours?

These are testing questions, but those who put them are the kind of people whom we wish to have settle among us. Without hesitation they can be answered in the affirmative. Canada is claiming for herself a position among the foremost modern countries, and in taking up the challenge she can show that her educational institutions bear comparison with those of any country in the world.

In making a general survey, it must be borne in mind that the direction of education rests with the individual provinces, and not with the Dominion as a whole. This was determined at Confederation by the British North America Act. As a result, only general outlines can be given in this sketch. But

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the manifest differences are between the other provinces and Quebec, which being overwhelmingly French-speaking and Roman Catholic, has instruction given, for the majority, in French, and under the control of the church. Apart from this, and including the English-speaking minority of Quebec, it may be said that a common type of education is being developed from one side of the Dominion to the other. This is due to the fact that those who went first to the West were Canadians from the East, and they carried with them to the West the institutions of the East. Also, these eastern Canadians from Ontario, Quebec, and the Maritime Provinces, being of similar origin and character, have developed their education along similar lines.

1. **THE COMMON SCHOOL.** Schools of this grade are under the care of the provincial governments, which maintain oversight of them by inspectors, and supplement local contributions by grants-in-aid. The standards and equipment of these schools are as good as those of corresponding grades in Britain and in the United States. In the larger centres they are very well provided for. The surroundings are attractive, and the health of the children is kept under observation; the discipline is good, the aim being to give the child a sound mind in a sound body, and to make the school a bright spot in its life. The most serious defect of the common school system is found in sparsely-settled country districts, where children are few, and sections employ only one teacher, usually an inexperienced young woman. But the attempt is being made to remedy this defect by instituting "consolidated schools," with several teachers and modern equipment, to which children are brought from a distance and mingle with others than their immediate neighbours. The scheme for consolidated schools is, however, not yet adopted widely, although the number of these schools is increasing.

The course of instruction in the common school covers the ordinary branches from the kindergarten up to the entrance to the high school, including nature-study, and often manual training, prescribed and taught according to approved modern methods. There are special series of readers and other text-books, prepared or authorized by the Departments of Education, and published at surprisingly low cost. With free

education, and cheap—in many cases practically free—text-books, every child has excellent advantages placed within its grasp.

Religious Education in Schools. In the common and high schools of the provinces, which are under governmental control, no denominational instruction is given, but as a rule the school is opened, and often closed, with the reading of Scripture, and the repeating of the Lord's Prayer. Further religious instruction depends upon the will of the trustees and the teacher. In the separate schools of Quebec, which are maintained by the Protestants, with government aid, definite Biblical teaching is given. In Ontario, the separate schools, under government, are, speaking generally, for the Roman Catholics, for whom, as in other provinces, also, special arrangements are made.

2. SECONDARY EDUCATION. The High School. The nomenclature differs in the different provinces—high school, academy, collegiate institute—and within the province according to its size and equipment. The buildings and equipment are good, not only in the larger towns and cities of the East, but in the western provinces, where some of the most prominent and handsome structures that meet the eye of the visitor to the leading centres, are devoted to education. The school-rooms are larger, bright, and airy; the scientific laboratories are, as a rule, well appointed, the halls are wide, and there is an assembly-room for the whole school. A library, and often a lantern for instruction, is provided. The buildings are placed as a rule in ample grounds, in which, and often in a gymnasium, the physical exercise of the pupils is supervised and given scope.

The subjects of the common school are continued in a more advanced stage in the high school: reading choice selections from English literature, composition, geography, history (British and Canadian), arithmetic, Latin and French, Greek and German, ancient history, algebra, geometry, trigonometry, physics, chemistry, biology treated experimentally in the laboratory. Bookkeeping, stenography, typewriting, and household science are offered for those who look forward to entering upon their life's work immediately on leaving the high school or collegiate institute.

Of those who remain in the high schools and collegiate institutes until they reach the advanced classes, the majority purpose entering the normal schools or the universities. Their studies are therefore determined by the requirements of their proposed careers. In most of the provinces the universities work in close conjunction with the Departments of Education, so that the subjects for the Leaving Examination and entrance to the faculties of education are, for the most part, similar to or identical with those set for Matriculation.

The age at which a boy or girl enters the high school is about thirteen or fourteen, and the course covers from three to four years, the pupil leaving at about seventeen or eighteen.

The fees for instruction are low—in many cases no fees at all are charged—the expense of the maintenance of the school being borne by the community and raised by taxation, except for a grant which is made by the province. These high schools are so numerous and well-placed in the different districts of the provinces, that a thorough education is within reach of any boy or girl who has the ability to take advantage of it.

The criticism most frequently passed upon our Canadian system is one also commonly made on systems in other countries, that the pupil is allowed or urged to take too many subjects, and consequently lacks thoroughness. But it is probable that the defect will be remedied in Canada, as elsewhere. Another defect is found in the teaching of languages. They are begun too late in the child's life, and their study is not sufficiently intensive. Possibly this may be due to the fact that we are a young country, in which the average man asks for the practical; but even from a utilitarian standpoint, French should be much more widely known in Canada, seeing that it is spoken by two millions of our compatriots, to say nothing of the facts that, as a language, it is so delicate in its constructions, so clear in point of style, and is the avenue to so rich a literature.

THE TRAINING OF TEACHERS. For the common school teacher, training is given in the normal schools of the provinces, in which a year is required for a license to teach under the provincial systems. The standard of entrance to these schools is that of University Junior Matriculation. For the

higher classes of these, and also the high schools, and collegiate institutes of Ontario, a year is necessary in the Faculty of Education. Also, to be a specialist, an Honours degree in Arts in the department to be taught, is a requisite. Similar standards are maintained in the other provinces. The great majority of teachers in common and high schools are women, but in cities and towns the principals and heads of departments are usually men, and as salaries improve the proportion of male teachers will probably increase.

PRIVATE SCHOOLS. For many years private schools, for both boys and girls, have been established. Often they have a denominational affiliation, and give more definite religious instruction than the government schools of the same grade. The leading boys' schools endeavour to maintain the ideals of the "public schools" of England. Girls' schools are to be found in nearly all the larger cities. In the newer provinces less expensive boarding-schools have been founded to afford education for the children of settlers, who may wish to give better training to their children than they can get in the local community.

Here is probably the best place to refer to conservatories of music. They are numerous, but especially good schools of music are to be found in the larger cities. The standards of the teacher of music in towns or villages are maintained by systems of local examinations, conducted by the Universities of Toronto and McGill, and by one or two leading conservatories.

TECHNICAL EDUCATION. This has two main divisions:—
(i) Technical in the narrower sense, and (ii) agricultural.

(i) *Technical Education.* A commission on technical education was appointed a few years ago by the Dominion Government, and has published an elaborate report; another has been made for the government of Ontario by Dr. Seath, Superintendent of Education. The Province of Nova Scotia has a widely-organized system of technical education, covering both trade schools and a technical college. The other provincial governments also make special grants for such schools, and probably the Dominion Government will before long aid industrial education.

In the common school, the child's attention is turned in this

direction by manual training proper. In the larger cities, such as Montreal, Toronto, Winnipeg, and Hamilton, technical and trade school instruction is amply provided for. The most recent school is that which has just been completed in Toronto, at a cost of \$2,000,000. These technical schools afford a broad education, including English, history, modern languages, and the sciences, as well as definite instruction in the application of scientific method to industry, practice in machinery, and the teaching of the trades which are chiefly engaged in in the locality. Though the facilities offered in the larger cities are already excellent, a great and extensive development may be looked for in the immediate future.

(ii) *Agricultural Education.* So far, the chief attention of the provinces has been devoted to the highest grades of agricultural education, to which reference will be made later. The Dominion Government has recently voted \$10,000,000 for like purposes, and in conjunction, the provinces are making serious efforts to adapt the teaching of agriculture to the rural school.

UNIVERSITY AND PROFESSIONAL EDUCATION. Early in the history of the provinces, the need of the establishment of a university expressed itself. In the older provinces the question was involved in the political controversies of the day, so that the history of the university bears the mark of many of the struggles of the province.

There are various classes of universities:—(a) *Provincial*, (supported by the government):—Universities of New Brunswick, Toronto, Manitoba, Saskatchewan, Alberta, and British Columbia. (b) *On private foundation*:—Dalhousie, McGill, Queen's (formerly denominational, now state-aided), Western, of London, Ontario, (grant from province to medical faculty). (c) *Denominational*:—King's, Acadia, St. Francois Xavier (all in Nova Scotia), Sackville (in New Brunswick), Laval, Bishop's College, Lennoxville, (in Quebec), McMaster, and Ottawa (In Ontario).

In Toronto the denominational universities of Victoria and Trinity have become federated with the University of Toronto and hold their degree-conferring powers in abeyance; St. Michael's (arts), Knox, and Wycliffe (divinity) are federated colleges. A somewhat similar system holds in Manitoba.

Nearly all the Canadian universities are co-educational. Women attend, especially in the Faculty of Arts and Education, to a lesser degree in medicine. The faculty of household science in Toronto is wholly a women's department.

Residences for both men and women are provided in most of the universities and colleges, and the number is increasing, partly because their educational value is recognized, partly of necessity in the newer provinces. It is probable that in the future the Canadian university will be distinctively residential.

The cost of university education is low, though there is a considerable difference in the fees of the various universities. Board and lodging are reasonable. In Toronto, *e.g.*, where, as in Montreal, the expense is probably highest, the weekly rates in residence and dining-hall are, for men, \$5.75; for women, \$6.00 or \$6.50. Non-residential students may get cheaper accommodation. Those who intend to enter a university should first enquire as to rates, from the registrars of the university or college of his choice. Scholarships (especially in the Faculty of Arts) are awarded, usually on the basis of Entrance Examinations.

Entrance to nearly all the faculties is by Junior Matriculation, which is maintained throughout the Dominion, on standards and subjects which are very similar, though some of the older universities make special requirements as to percentages. Honour courses in arts and professional faculties have exacting requirements, a fact which should be kept in mind by intending students. Junior Matriculation requires at least three years in a high school. There is also a higher examination in several of the provinces, requiring, as a rule, two more years in school—which is of a standard equivalent to entrance to the second year in arts—as the basis on which some of the universities grant scholarships.

The faculties of the various universities, differing in different institutions, are arts, including the pure sciences (to which the colleges confine their teaching), medicine, law, applied science, education, forestry, and dentistry.

By far the largest faculty is arts. The B. A. degree is given on a four year's course, after Junior Matriculation. It may be taken either on the pass or honours standard. Unlike the

American universities, those of Canada have preserved this distinction from their British exemplars, the result being that the best Canadian arts degrees are recognized as being of a high standard, and occasionally include work equivalent to the first year of graduate study in American universities. Most universities also give a B.Sc. degree in the pure sciences. The M.A. degree is now given for at least one year's advanced study, after the earlier degree.

Graduate work leading to the doctor's degree is offered by McGill, Queen's, and Toronto, and it is to be expected that the leading Canadian universities will in the near future take their place alongside the older and best American institutions, in the opportunities they will offer for research and advanced study. This will involve in each case superior library advantages, laboratory facilities, a large staff, and an adequate system of scholarships.

Medicine. In the older provinces there are Faculties of Medicine in Dalhousie, Laval, McGill, Queen's, Toronto, and Western (London). In the newer provinces, medical education has already been begun, and Winnipeg has had for some time a good medical school, which is rapidly attaining eminence. Alberta University does the work of the first three years, and has made arrangements with Toronto and McGill to give recognition for this to its students. Toronto and McGill have reciprocity in medical education. With their thoroughly equipped laboratories, their privileges in great hospitals, and full-time professors in all but the clinical departments, they offer a training in medicine that is abreast of the best on the continent.

Law. Dalhousie, Laval, McGill, and the universities of the western provinces have Faculties of Law. At Laval and McGill special attention is paid to French law. The three years' course leads to the LL.B. degree. The same degree is given by the University of Toronto, but the professional instruction in law is given for the province of Ontario in Osgoode Hall Law School, which is under the control of the Upper Canada Law Society.

Applied Science. This is well provided for, especially in the larger universities. Four-year courses leading to degrees in civil, electrical, mechanical, mining, metallurgical, and

chemical engineering, and also in architecture, are laid out on the basis of such thorough laboratory and practical instruction that it is not necessary for the Canadian youth to leave their own country in order to obtain a training in advanced technical education. Indeed, students have already been drawn from other countries to the faculties of the larger Canadian universities.

Dentistry. The leading school of dentistry in the Dominion is the Royal College of Dental Surgeons of Ontario, which provides a four years' course, at the end of which a license to practise dentistry in Ontario is given, and the degree of D.D.S. may be received from the University of Toronto. A similar degree is given by McGill, Laval, and Dalhousie, in connection with their faculties.

Agriculture. The oldest and largest college in the Dominion is the Ontario Agricultural College, at Guelph, which offers many courses of instruction, from a few weeks' to a four years' curriculum, leading to the degree of B.S.A. in the University of Toronto. The Macdonald College, a splendidly equipped institution, along with government colleges, does similar work for Quebec. This college is the agricultural faculty of McGill University, which also gives the degree of B.S.A. In the newer provinces, agricultural faculties, or colleges, are connected with the universities, and form an extremely important part of their work. In Nova Scotia, an excellent college is maintained by the government, at Truro.

Instruction in forestry is given to some extent in these agricultural colleges. The government maintains a School of Forestry in Quebec, and there is a department in the University of New Brunswick; in Toronto there is a Faculty of Forestry in the university, with a four years' course, leading to the degree of B.Sc.F.

Household Science is taught in the University of Toronto, which has a faculty and a splendid building devoted to the subject, with courses recognized for the B.A. degree. At McGill (Macdonald College), and at the Agricultural College, at Guelph, schools have been established.

Music. McGill University has a well-equipped department, with a professor of music, and offers courses of instruction leading to the degree of Mus.Bac. The same degree, based on

work done in recognized conservatories of music, is given by Toronto and Dalhousie.

Veterinary Science. This is taught in the Ontario Veterinary College, in Toronto, which has just been housed in a magnificent building, with excellent laboratories. It is maintained by the provincial government. The Quebec Government maintains a school at Montreal.

Pharmacy. Instruction in pharmacy is given in different provinces, and degrees, on the basis of recognized instruction, are offered by the universities—in Nova Scotia, by Dalhousie; in Quebec, by Laval; in Ontario, by the College of Pharmacy, and the University of Toronto; in Manitoba, by the Manitoba University.

Theology. From the foundation of higher education in the provinces, provision has been made for instruction in theology, but of necessity only the denominational colleges and universities have had Faculties of Theology. Those churches which did not maintain arts colleges, established theological colleges, and placed them alongside the university, and all the provincial and leading universities have such colleges affiliated to, or federated with, them. These are, as a rule, graduate schools, for which the preliminary arts course is taken in the universities with which they are affiliated. Many of these colleges have the right to grant the B.D. degree.

Relatively to its population, especially in the older provinces, it may be said that the Dominion has developed university and professional education to a high degree. The eagerness and liberality with which the newer provinces are equipping their universities are proofs of the quality of their people.

THE WORK OF THE CHURCH IN THE DEVELOPMENT OF CANADA

BY CHANCELLOR R. P. BOWLES, M.A., D.D., LL.D.*

Of the effects this war will have on the religious life of Canada it is not wise to speak with much assurance. Eddies and whirling waters may be mistaken for the river's central currents. Some planets move in orbits so vast that it is difficult to detect their curve. Moreover, so immersed are we in this momentous conflict, so under the dominion of strong passions, we cannot get outside and make and correct observations so as to determine the direction of the movement. Will this war, vast as it seems to us, prove but a temporary disturbance, all things returning to their normal courses when it is ended? Or will the direction of history be changed and life's forward thrust permanently altered? As for Canada, it is being asked everywhere will the great stream of immigration be augmented or decreased. Is the period succeeding the war to be one of commercial and financial expansion, or will the phenomenal growth of recent years be checked? The prevailing voices declare for increased immigration and greater expansion, and they are probably correct. On that assumption this is written as a review of religious conditions in Canada, written to be a help in answering questions which intending immigrants are likely to ask. What is the character of the religious life of Canada? Will it furnish to those who desire to live in the communion of the church opportunities and privileges equal to those they leave behind? What is the attitude of the nation, what the common social sentiment towards Religion? Will the new arrival be at home in new church relations?

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While these questions in their deepest significance are not answered by statistics, the census returns will undoubtedly interest inquirers and furnish valuable information.

Of the total population of Canada, numbering at the last census about 7,200,000, over 2,800,000, or nearly 40%, were Roman Catholic. Of this number it should be remembered 1,724,683 were in the Province of Quebec, where the Roman Catholics represent 86% of the population. There is, however, no large section of Canada where this ancient church is unrepresented. It may be safely said that in whatever part of Canada they settle, very few devoted adherents of the Roman Catholic Church will find themselves beyond the reach of its ministrations. The Province of Quebec is the home of the French-Canadian whose faults, be they what they are, are not disloyalty to his church or lack of genuine religious sentiment and simplicity of faith. Indeed in these qualities the habitant lives a most exemplary life, and no adequate reckoning can be made of Canada's religious life, if he is overlooked. The character of the schools, the type of education imparted, the reverence for sacred things manifested by young and old, the consecrated places of the dead, shrines to which pilgrims journey, the frequent wayside cross, the splendid church edifices, all testify to a piety like that of mediæval days. The same conservatism is not evident in the Roman Catholic Church in the English speaking communities. Here the type of education, although frequently given in Separate Schools under the jurisdiction of the Church, approaches more closely the education in the Public Schools. In higher education there is considerable fraternity. St. Michael's College is one of a group of Arts Colleges in the University of Toronto, whose students enjoy the advantages of a common University professoriate in certain subjects. Fellowship with Protestant churches is also evidenced in moral reform movements. Within the church itself are found both conservative and modern types of thought and life. The Roman Catholic suffers no disabilities whatsoever as a citizen. Frequently in the play of party politics he enjoys a considerable advantage. Certainly he plays his part well in the political and civil life of the country.

Of Protestant bodies the largest in Canada according to the

last census is the Presbyterian, with a total of 1,115,324. In the census of the two previous decades Methodism had stood first in numbers. Between 1901 and 1911 both Anglicanism and Presbyterianism showed more rapid growth than Methodism, no doubt due to the larger gains received by these bodies from immigration. The census shows Methodism second in 1911 with 1,079,892 and Anglicanism third with 1,043,017. Practically, these three bodies are equal in the numbers of their adherents and communicants. The Baptist Church has shown considerable increase, from 318,000 in 1901 to more than 382,000 in 1911. A very large proportionate increase is seen in the Lutheran Church, from 92,524 in 1901, to 229,864 in 1911. The growth of the Jews from 16,401 to 74,564, and of the Greek Church from 15,630 to 88,507, is also indicative of the character of the immigration of the period.

These figures are instructive from the point of view of the church affiliations of the people. They do not, however, answer the significant question of the character of the religious life of Canada, although indicating some of its qualities. They evidence such variety as makes any broad generalizations difficult. They testify to one quality in particular—the religious freedom enjoyed and the absolute equality of all religious bodies before the law. There is scarcely a single variety of religious life which did not disclose itself to the census enumerator who discovered at least 57 different classifications. The widest possible freedom and largest measure of civil recognition is accorded to all. No established church overshadows with social and civil prestige the other churches. In religion as in education true democratic principles prevail.

If in these new conditions any church would suffer any disadvantage it would likely be the Anglican, whose members are called on to adapt themselves to this new order of things. The proper support of the church by voluntary contribution is attained only by years of training and by the creation of social standards of voluntary giving. If the givings to church and missionary enterprise and the support of the local clergy in Canadian Anglicanism is not equal to that in some of the other bodies, the explanation lies probably in the direction indicated. However that may be, the Church of England in Canada by those very elements, which it has derived from

its historic nationalism, is uniquely adapted to meet the needs of the newcomer whose love of England is always intensified by distance and absence. Not only his religious needs, but his patriotic sentiment and national pride, are ministered to by her ancient forms of service and prayer. The Anglican Church here may not be what it is in England, the Church of the Squire and the Landlord, it may possess no social or civil advantages of any kind, but it carries with it the same breadth of view, both in matters of practical living and theological belief, and the same inner diversities of the spirit which, in the eyes of some churchmen, are the notes of true Catholicity.

The Presbyterian will find little to criticize and much to praise in his new church surroundings. Although showing changes due to altered environment, Presbyterianism has remained true to type. No church in Canada has in its pulpits a greater number of distinguished preachers. The sermon which is pronouncedly evangelical holds the place of distinction in the service so characteristic of Presbyterianism, and the minister, although ecclesiastically possessing less authority than the Anglican rector or Methodist preacher, counts for all his personality is worth, and frequently gives his name and reputation to the church he serves. The Book of Praise when issued some years ago was the finest collection of hymns and psalms in use in Canada, and it has greatly enriched and dignified the services. It is noticeable, too, that the fellowship of Presbyterianism in Canada is very strong, being greatly intensified by national sentiment. It is doubtful if any love Scotland as devoutly and fervently as do her thousands of exiled sons in Canada.

Recently there has been a great dearth of candidates for the ministry, and theological colleges have found their classes much depleted. For capable young men whose thoughts are turned towards the Christian ministry, perhaps the Presbyterian Church in Canada offers as fine opportunity as will be found anywhere.

Methodism is ubiquitous in this new land. It seems to have a genius for thriving in rural places. Certainly in days gone by its great revivals, in camp meetings in the woods in summer and in protracted services in the churches in winter, fre-

quently swept the whole countryside. As a result there are whole sections of Ontario which are now almost entirely Methodist. It is probable that nowhere in the world does the Methodist Church count for more in the life of any large section of people than in the Province of Ontario, and particularly in the City of Toronto.

The aggressive power of Methodism in Canada has not in recent years been equal to that of earlier times. It has, however, conserved and consolidated its forces, and in pushing forward moral reforms is to-day the acknowledged leader. In 1885 Methodism united all its forces, so that the new arrival will miss the distinctive badges worn by the Methodists of the old land. The words Primitive, Bible Christian, and Wesleyan have almost vanished. The younger generation do not know these terms. Some features of Methodism such as the use of local preachers and the circuit system have also largely disappeared, while as yet the great mission halls found in England have not been duplicated in Canadian cities. On the other hand Sunday School and Young People's work have reached a development beyond that of the Old Land.

Perhaps the most interesting feature of the religious life of Canada, to the newcomer, is its wide variations from the typical forms seen in the older countries. Here the churches are comparatively young and manifest characteristics of youth, the adventurous spirit often leading to strange places. The conservative love of old forms gives place to new and untried methods. The freedom of self-expression often runs riot. This may be seen in church architecture, many religious edifices being shockingly unlike churches and some of them even grotesque. The absence, or scarcity, of fine specimens of church architecture partly accounts for this phase. It is largely, however, due to the free spirit of pioneer life. People who build their own houses after a style of their own devising do not hesitate to undertake to design their own churches. Many of the prevailing types in the older parts of the country can be traced back to the necessities of primitive conditions.

In a new land the church widens its functions and becomes not only a religious, but also a social centre. In the sparsely settled parts people go to church to see one another and ex-

change kindly greetings as well as to worship. It is not uncommon—indeed it is the custom in many parts—for the worshippers to linger in the aisle or vestibule a long time after the conclusion of the service. Week-day evening services serve the same dual purpose. Especially is this true of the various Young People's Societies which hold their services as a rule on a week-night. Church anniversary gatherings are also rallying social days. On such Sundays the church is usually crowded and on Monday, or some other evening of the week, is held the "strawberry festival," or "fowl supper," or old-fashioned tea-meeting. Frequently these are preceded by football or baseball games. The evening programme in the church or in the town hall—if such is available—is generally a concert, sometimes by home talent and sometimes by distinguished artists from a distance. Of one of the evangelical churches, a smart magazine writer once wrote that its chief power was in the kitchen stove in the basement. Certainly these social gatherings are features in rural church life in Canada.

Recently—although as yet the movement is by no means general—several churches, led by aggressive pastors, are adding to their activities Farmers' Clubs and Women's Institutes, where questions of scientific agriculture, household economy and such-like matters are discussed, to the advantage of the community. Nor is it at all certain that these marginal activities have drawn the churches away from their chief function. Any such criticism would probably be as unwarranted as it is superficial. The churches most noted for these social activities are by no means least noted for missionary zeal, for reverence in the service of praise, for bible study, or for attendance on the regular means of grace.

Next to these variations from conservative types, perhaps the most striking characteristic is the deep note of catholicity which can be found in all the churches. A hurried glance at the numbers of denominations found in Canada would probably give the impression of prevailing sectarianism and complete ecclesiastical disintegration. The fact that three great Protestant denominations are almost equal in size might shatter any churchman's hope of there ever arising in Canada a truly National Church. A better insight into conditions

will discover side by side with all these differences, a marked approach towards unity. Characteristics which were once the exclusive property of one body are now shared by all. The Presbyterian has no monopoly of intellectual culture, nor the Methodist of religious zeal. The Anglican's love of liturgy is spreading to all the churches. How could it be other than this, when one remembers the advance of theology as a science, the influence of a common public school system, the growth of the social and fraternal spirit in the church life, and the necessity of mutual recognition imposed on the churches by their pioneer missionary work. The approach towards union by the Presbyterian, Methodist, and Congregational bodies—which, notwithstanding difficulties now in the way, will no doubt before long be consummated—is evidence of the growth of a truly Catholic spirit.

If one regards religion as the expression of man's relationship with God, there is no reason to doubt that the church life of Canada ministers to the human need of the Divine and to the faith which unites the creature to his Creator. The native Canadian, ambitious and enterprising, and enamoured of material success, is not secularistic, much less atheistic. He comes of an ancestry which passed through the floods of great revivals. The parents who hewed out for themselves homes in the great lonely forests, whose only distant vision was upward to sky and stars, whose personality was deepened and enriched by much solitude, who welcomed the missionary to their humble homes in the wilderness, have begotten children like themselves. Church-going is their habit. They keep the Sabbath, not in puritanic solemnity, but in cessation from every-day toil, and devote the day to worship and the deeper culture of home life. There is in Canada the atmosphere of a common social faith.

Canada is not lacking in the humanitarian and practical view of religion. The altruistic spirit is growing. In many instances the rich are consecrating their wealth to high objects. Splendid hospitals are being erected and maintained, where the poorest citizen may have the benefit of the finest skill of the surgeon and physician. These hospitals are springing up in towns which until recently were altogether without such accommodation. The same spirit is entering into busi-

ness life and is evidenced not only in legislation designed to benefit injured workmen, but in the treatment accorded to employees in many large and representative factories and stores. The ideals of service to humanity are uplifted in pulpits formerly given almost exclusively to expositions of theological doctrines, and religion is defining itself in this new land as brotherly service and social obligation.

Religion is also manifested as an antagonism to evil of every kind, and in Canada this is seen in the great advancement of moral reforms. Of this the temperance movement is a notable example. It is possible that many newcomers and many contemplating emigration will at first fail to interpret rightly the prohibition legislation now making such headway. To regard it as evidence of narrowness or fanaticism is to misinterpret it entirely. It is but one of the many social movements which seek the good of the community as a whole, even at the sacrifice of personal and individual rights. It does not mean the suppression of free personal life. The suppression of the personal is not the characteristic of new democracies. Here in this young country, conventional and artificial restraints are few. The strong, growing, free citizenship of Canada scents no danger to itself in this prohibition movement. It does recognize a common social danger, and under the impulse of unselfishness and patriotic motives, abetted by economic considerations which the war has greatly accentuated, dares to disregard the great watchwords of a past time in the endeavour to meet an actual condition with a practical remedy.*

Valuable allies in the work of the church are the Young Men's and the Young Women's Christian Associations. The former was inaugurated in England by Mr. (subsequently Sir) George Williams, in 1844, and extended to Canada about twenty years later. Its branches in the Dominion now number ninety, with a membership of some 50,000. Truly, its founder builded better than he knew. The "Y. W. C. A."—the sister association—was founded, also in England, by the

*It is impossible in such a short article as this to do justice to so large a theme. That nothing has been said specifically of the Baptist Church, the Salvation Army, the Congregational, and Lutheran Churches is a matter of regret. Fewer in numbers these bodies are, but they are by no means unimportant in the life of the country.

Lady Kinnaird and Miss Emily Robarts, in 1855, the first Canadian branch being organized in 1866. To-day it has branches in thirty-one cities and towns, and a membership numbering about 18,000. Uniformed Travellers' Aid representatives meet incoming boats and trains for the purpose of assisting newcomers, as well as members generally, with advice and information on any helpful matter. Constant visits are paid to industrial centres, thus keeping in close touch with the workers. Both associations maintain excellent accommodation—with libraries, gymnasia, swimming baths, etc.—where their members can also board and lodge at a most moderate cost.

The good results achieved by these institutions—irrespective of the untold benefits the Y. M. C. A. has conferred on the rank and file of our armies—in educational, religious, social, and physical development work are almost incalculable.

THE HIGHWAYS OF THE DOMINION

THE FUTURE OF CANADIAN RAILWAYS

BY F. P. GUTELIUS, C.E., Sc.D.*

The first great problem which confronted the Fathers of Confederation of the Dominion of Canada was that of transportation between the different provinces. They undertook at once to provide railway communication from Nova Scotia to British Columbia. At that time there were several short railways in different provinces, which were constructed for the local traffic in the settled districts of Canada.

The Grand Trunk Railway—the pioneer line, incorporated fifteen years before Confederation—began construction and carried to completion lines between Montreal and the United States border, *via* Richmond and Sherbrooke; from Rivière du Loup to Richmond; and from Montreal to Sarnia. These lines did invaluable work in assisting the development of the country which they served. Later, in connection with its Intercolonial Railway scheme, the Dominion Government bought the Grand Trunk's line along the shore of the St. Lawrence River, from Levis to Rivière du Loup (124 miles).

The linking-up of the provinces started with the Intercolonial Railway, which was constructed as a government railway, and has ever since remained so. The construction of a transcontinental railway, whereby Quebec was to be connected with British Columbia, was started as a government undertaking, but in view of the slow progress and the magnitude of the undertaking, the government turned this transcontinental line over to the Canadian Pacific Railway Company, which, with liberal subsidies, was able to complete the construction.

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The portions of Canada through which the Canadian Pacific Railway was built were undeveloped, and the natural resources of the country were unknown to such an extent, that it was considered by some pessimistic people that the railway would never collect sufficient revenue to pay for the grease used in lubricating the cars and engines. The men engaged in the construction of this railway, however, learned something of the fertility of the Canadian prairies, and in a short time the railway through Manitoba was bounded on either side by fertile farms. The general growth of the railway made these distant fertile regions available for settlement, and this settlement followed so rapidly that, whether intentional or not, the government of Canada adopted a policy whereby cash subsidies were granted to railway companies for the construction of railways into new districts, where the natural resources appeared to be such as to justify their construction and operation, that is, the railways were constructed first, and the settlement of the country followed. The result of this policy has been that since Confederation the government of Canada has subsidized one hundred and fifty-seven railways, the amount paid being \$92,566,152.69, and at present we have in the Dominion of Canada 30,794 miles of railway for 7,204,772 people. This, compared with the older countries, indicates that the railways of Canada have already opened up sufficient territory to take care of practically double our present population, i.e., our railways pass through large tracts of fertile lands which are waiting for settlement. Not only is this true of the western provinces, but it is equally true in the provinces of Nova Scotia and New Brunswick.

These undeveloped prairies and farm and timber lands extend from Nova Scotia to British Columbia.

In the Maritime Provinces only one-tenth of the arable land is under cultivation, whereas 75% of the arable land of these provinces is within twenty miles of railway or water transportation. The provinces of Nova Scotia and New Brunswick are capable of maintaining treble their present population, so far as transportation facilities are concerned, and they are so located as to enable their products to be delivered readily to Europe or to the United States.

The settled portion of the Province of Quebec does not occupy one-tenth of its total area, whereas the character of the soil and climatic conditions are such as to enable one-half of the total area to become productive farms, and at present railways are constructed through these lands, which are waiting for the settler. These lands are to be found along the Transcontinental Railway, and along the Canadian Northern and Canadian Pacific Railways, in the northern portions of the province.

In Ontario, similar lands are to be found along the Canadian Pacific, Temiskaming & Northern Ontario, Transcontinental, and Canadian Northern Railways.

The provinces of Manitoba, Saskatchewan, and Alberta, during the past ten years, have experienced the greatest growth of population of any portion of the Dominion. Railway construction has barely been able to keep pace with the influx of settlers, and those vast areas of fertile lands are being rapidly changed from unproductive prairie to most fertile wheat-fields.

Railway construction in British Columbia also preceded the settler, not only in the first instance by the main line of the Canadian Pacific Railway, but later by the Crow's Nest Pass Railway, where the coal and timber products were sufficient to tax those railways to their capacity within two years of their completion. The Grand Trunk Pacific and Canadian Northern Railways have opened up the north-western portion of British Columbia, from the Yellowhead Pass to Prince Rupert, where the first crop of timber is awaiting the early settler. When that timber is removed, those British Columbia valleys will develop into farms of the same fertility as those that may be seen along the older railways.

It would seem, therefore, from the railway and transportation standpoint, that Canada's immediate future has already been provided for. This shows the wisdom of the government policy referred to above in the rapid development of a new country.

THROUGH CANADA FOR SPORT AND PLEASURE

BY FREDERIC YORSTON, B.A.*

The late Principal Grant, of Queen's University, made the first famous exploratory journey through the then newly-formed Dominion of Canada. His trip from the Atlantic to the Pacific in the early seventies was, in many respects, more important in a publicity sense than any trip that had previously been undertaken.

It is impossible to do justice to such a tremendous subject allowed to me, "Through Canada for Sport and Pleasure", in the compass of a few pages, but I may preface a general survey by saying that it has been my privilege to make two historic journeys throughout this great country. When the Duke and Duchess of Cornwall and York—our present King and Queen—visited Canada in 1901, I had the pleasure of making the journey with them, and had a unique opportunity of visiting the beauty spots of Canada at that time, under the most favourable conditions, and of also getting an idea of our wonderful game resources.

When the new National Transcontinental was opened, in the summer of 1915, I had another historic opportunity for seeing new districts of Canada opened up for settlement. We went from Toronto first in a northerly direction, and then westerly towards the Pacific. It was a wonderful journey with the wheels of the new "National" running into the far West for the first time along an all-Canadian national route. "Westward Ho!" the wheels seemed to be saying as the

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magnificent nine-coach train rolled us towards the Rocky Mountains.

Into the Golden West we plunged along the shining rails right into the sun's eye; all day long we reeled off the miles in a bright daylight, until half after nine in the evening, breathing an atmosphere unsurpassed for purity and bracing effects on the whole continent.

Through this wonder-country—this land of mystery—this majestic northland—we plunged, by day and night. Phantoms of old *coureurs de bois* passed us in the gloom, and the ghosts of many hunters and trappers of the long ago, who traded in and out of Hudson Bay. Wonder-eyed, they seemed to stand stricken at the strange spectacle, as the enormous express thundered through the gloom at seventy miles an hour. Deer watched us from the edge of the woods, and a giant moose raced along in a speed contest with the iron and steel marauder. Small towns flew by, as did many solitary clearings. There were the old, deserted construction camps, and bright, new dwellings of the settlers. Giant lakes and rivers there were, sparkling in the sun, or shining like silver in the moonlight. Enormous game forests were passed, in whose recesses, far from the eye of man, lodged safely a vast furry kingdom, and all around was the wonderful air and the majesty of nature.

My first journey of exploration, however, was made in the eastern part of Canada. As a boy, a party of us chartered a small steamer and sailed from Pictou, Nova Scotia, out into the Northumberland Straits. Passing through these waters which, in the early days, were doubtless sailed by *Maison-neuve*, Jacques Cartier, Wolfe, and other heroes of old, in their voyaging up the St. Lawrence to Quebec, we sailed, in our little craft, along the shining waters of the strait of Canso, which separates Cape Breton from the mainland, passing through to the ironbound coast. We had nothing betwixt us and Europe, except the heaving sweep of the Atlantic, and here we stopped at the little town of Arichat. It lies perched on the cliffs, and is really a narrow street along the top of precipitous crags.

As a beauty spot, however, Arichat gives one only a faint idea of nature's generosity to the Island of Cape Breton.

Like Newfoundland, lying far off in the distance, the Island of Cape Breton has never yet been fully explored. There are deep, woody recesses up towards Cape North, where, in all probability, the foot of man has never trod. It is a land of mystery and a land of beauty. The hills are wild and romantic, and the hearts of the people are warm and hospitable.

There is a Highland Cape Breton, with every man proud of his race, and the strip of earth upon which he was born. The people of this little sea-girt isle have for their proudest thought that they are loyal to the traditions of their fathers, and that they are of a country where blood still runs true.

Here, near the lovely Bras d'Or Lakes, we find descendants of the Camerons, the Campbells, the Macdonalds, the Macdonells, the Macfarlanes, the MacLeans, and other clans famed in Scottish history. In little hamlets throughout the Island the war pipes still awaken memories allied to the storm periods of Scottish history. The gray-haired grandfather will still tell you tales of the "Forty-five". Their fathers departed at duty's call to many a stiff encounter. The very atmosphere of hard-fought battles, the cheering of men to battle, the swing of kilt and plaid, and the steady tramp of the lads with the philabeg to the music of the old clan marches is in the air.

Volumes could be written about the beauties of Baddeck. There are beautiful, shiny expanses of water. There is good fishing near by, and from here to the Margaree Salmon Pools is a delightful drive of thirty miles. Sydney, or Whycocomagh, may be reached by steamer from Baddeck. The sail is surrounded by scenery of marvellous beauty.

Sword-fishing, on St. Peter's Bay, is a pastime to be enjoyed by those who want sport that is really thrilling. These big fish are quite plentiful, and arrangements can be made with the owners of fishing boats for this pastime. The swordfish are caught by harpooning them while they are basking on the surface of the water.

Moreover, Mira Bay, St. Peter's Bay, and St. Ann's Bay are, during the summer, visited by the leaping tuna. To land one of these monsters with a hook and line is a feat that few have accomplished, although many have tried.

Crossing these beautiful waters, the very breezes seem to

say, "Are you fond of sailing?" "Do you love the dip of the great sheet to the breeze, the singing of the wind through the cordage?" "Do you love fishing?" Here you can sit all day over a still, black pool, or you can whip the lace-white rapids and fight a trout to a glorious finish, or, again, you can put out to sea in a dory, and haul in the cod and the mackerel, with lobster-spearing for a change on the morrow. Here the days of the Spanish Main seem just around the corner, and were you to meet Captain Kidd in the twilight you would not be greatly surprised. Doubtless, some of the lads who go abroad on the waters to pull the cod from the waves are descended from Kidd's sailormen. They certainly display the same daring recklessness in dodging the big liners.

Crossing the Straits of Northumberland, we come to Prince Edward Island. In all Canada, there are probably no such startling contrasts as we find in approaching this "Garden of the Gulf." Here we have lovely, fleecy, white clouds drifting over water of the deepest blue, which beats against cliffs of the reddest clay, mingled with green foliage of the most lovely tint.

The early French explorer's "La baffe et belle Isle"—low and beautiful island—and the Islander's "Garden of the Gulf," are sobrequets as eloquently descriptive of Prince Edward Island to-day as when they were first bestowed on this province. Here we have a gentle, undulating surface. Here are no mountains and no forests, to speak of, but there are copses and clumps of trees visible on every hand, giving a charming variety to the agricultural scene, and wild bits of woodland are still to be found. Here we have the stately elm and sturdy oak, the white-barked, delicate birch, the slender Lombardy poplar, and the dark pyramidal spruce, while the reddish hue of the soil makes a charming contrast with the vivid green of the vegetation.

From Prince Edward Island, we can get a view of the surrounding mainland. Sixty miles off on the horizon we see the county of Pictou. In that county—on the top of one of the most beautiful elevations in Canada, Green Hill, beloved by Joseph Howe—a panoramic picture of natural beauty can be seen, which embraces four or five additional counties.

No tour to this part of Canada would be complete without

visiting the city of the Loyalists, St. John, New Brunswick, and travelling thereafter to the storied land of Evangeline, and the meadows of Grand Pré, where our Premier, Sir Robert Borden, was born, and which has been rendered so famous by the genius of Longfellow.

The special period of the year to make this trip is when the apple blossoms are in bloom. The scene is one of the most bewitching beauty, beauty which, indeed, is a world-wide topic of delight among the thousands who have visited this locality at the apple-blossom period of the year.

Passing through the famous Matapedia valley, on the way to Upper Canada, the visitor is impressed by the wonderful game areas in this part of the country. It is a strange fact that while Quebec, and the Maritime Provinces of New Brunswick and Nova Scotia, were the earliest settled portions of Canada, they still remain, in many respects, its best big-game territory. There are hundreds of square miles of forests and barrens, where the moose, caribou, deer, and bear, roam as free as did their kind a hundred years ago. In the case of the moose, caribou, and the deer, they are distinctly better off than were their forbears, owing to the strict enforcement of the provincial game laws, which is also accountable for the marked increase in recent years of these denizens of the forest.

What is said of this country, as a great region for hunting, is equally true of it with regard to fishing. Although many of the noted streams are under lease, there is still plenty of opportunity for salmon fishing, while there is no lack of the best angling for trout. Sportsmen come from all parts of the world to fish the famous Metapedia Salmon Pools. With such a stretch of coast-line, it will also be readily understood that there are innumerable opportunities for deep-sea fishing. This sport includes cod, haddock, and mackerel. Excellent wild fowl shooting is to be obtained. Duck, partridge, plover, woodcock, and snipe are plentiful, and the fall shooting of geese, duck, and brant are worthy of special mention.

If we go north from Québec, we reach the wonderful Lake Edward region. Here one can be splendidly fitted out and transported by canoe, accompanied by competent guides, for hundreds of miles in every direction. If you would spend a happy vacation, it is necessary only to get into touch with

Philip, the big and famous guide at Rowley's, who will paddle you through these wildernesses of water; who will do your cooking for you; who will show you the places where the biggest deer are; who will bring you into actual contact, if you will, with moose, wolves, or any other animals in that region.

I have taken Philip—or Philip has taken me—on interesting journeys. He has paddled me up so close to gigantic moose that I could see the whites of their eyes. On one occasion, we paddled very close to a huge timber-wolf, in the Lake Edward district, as close, indeed, as half the breadth of the average Canadian street.

Sixty-four miles from Montreal, on the shores of picturesque Lac des Sables, is Ste. Agathe des Monts, which has grown to a summer resort of some pretensions, and a winter playground for ski-runners and tobogganers. Twelve miles beyond Ste. Agathe is St. Faustin, a place favoured by the trout fishermen of Montreal, who frequent the Laurentians during the summer.

The Gatineau valley, near Ottawa, is a country of countless lakes, wherein abound the gamiest specimens of the finny tribe, the black bass, speckled trout, the maskinonge, pickerel, pike, and gray trout. In addition, the North American red deer is found everywhere in the Gatineau country. Moose are to be met with north of Maniwaki.

The giant Canadian Rockies demand special attention. Forty-seven years ago two adventurous young Englishmen—Viscount Milton and Dr. Cheadle—after passing the winter in a Saskatchewan forest, set out from Edmonton to cross the Rocky Mountains, and so reach the Pacific coast by overland route. After a most laborious journey, attended with much hardship and often with great danger, they accomplished their purpose. They crossed the Rockies by way of the Yellowhead Pass, which accurate surveys have since determined to be the easiest passage through the mountains, and because of that, among other reasons, it is the route followed by the Grand Trunk Pacific Railway on its passage across the great divide. Milton and Cheadle, with their little party, consisting of an Indian guide and a camp follower, journeyed almost due west from Edmonton, and after a time they came in sight of the foothills and the vast mountains beyond.

In time they reached the valley which led up among the mountains, and through which ran the route to the Pacific slope. Following this route, they arrived at Jasper House, an ancient landmark even at that time in the geography of this part of Canada.

One hundred years ago, Jasper House was one of the most important trading posts of the Hudson's Bay Company in all the far North-West, being the centre for all that country about the head-waters of Athabaska River. It was built in 1800 by Jasper Hawes, who is frequently referred to by the early explorers of the upper Rockies. Notwithstanding the change brought about by the altered conditions in the fur trade, there is now no danger of the name being lost; it is preserved in a manner more permanent than could have been afforded by the existence of a rude wooden fort in the mountain wilds. The vast tract of country surrounding it, of which the Yellow-head Pass is the western outlet, has been set aside as a national reserve, and has been given the name of Jasper Park.

This national playground of scenic beauty and grandeur, and largely unexplored wonders, covers 5,450 square miles, almost one-half the size of the Kingdom of Belgium, and somewhat more than one-third the size of the Kingdom of Denmark.

No general description that is at all adequate can be given of a tract of such magnitude, and containing such a variety of physical features, as are to be found in Jasper Park. Here are huge tracts of forest in which the lumberman's axe has never been struck, and whose depths have as yet been penetrated only by Indians and hunters; here are wood-clad hills, where the timber is less dense, with here and there sunlit glades, bedecked in season with brilliant flowers; here are open valleys through which flow winding rivers, and away back from whose banks are wide stretches of meadow-land covered with luxuriant grasses.

As one advances westward the hills increase in number and size, and finally they swell into the gigantic Rockies, into whose gorges and ravines the bright light of day never penetrates, although their snow-capped peaks sparkle in the brilliant sunshine. Approaching from the east, these mountains, rising one above the other in grand array, seem to form an impenetrable barrier, against which further progress is im-

possible. Out from among the mountains flow the hurrying waters of the Athabaska; along its valley is found a way provided by nature, by means of which the prairie to the east can find a western outlet to the Pacific coast.

Besides its compelling attractions of scenic grandeur, the region of the Yellowhead Pass has other possessions that, as they become more widely known, will draw to it thousands of visitors in search of health. The altitude, which can practically be varied at will, the presence of immense forests of fir, and the bright sunshine which prevails throughout most of the days of the year, give to the air of this region invigorating and health-giving qualities, probably unsurpassed anywhere on the continent.

From Edmonton, west to Prince Rupert, we pass through a land of great lakes, majestic mountains, deep canyons, and mighty rivers. A visit to the Mount Robson region shows the Rockies at their best, amid vistas of surpassing loveliness.

Have you ever crossed the series of great inland seas known as the great Canadian lake system? You have a choice of travel on great steamships. It is early evening when you embark, and after dinner there is dancing in the big ball-room; a full orchestra is carried, and you enjoy all the wonders of a star-lit night on the lakes. The following morning, the beauties of Lake Huron unfold themselves; then through the Sault River you pass at noon to Lake Superior. The next morning finds Thunder Cape towering above the vessel, its rocky base carved into a thousand curves by the turmoil of the sea. Thunder Bay is passed, and Fort William reached just after breakfast. This marks the completion of a forty-hour sail across the largest bodies of fresh water in the world.

From Fort William we journey across the south-western corner of the Province of Ontario. This is a great game paradise, watered by hundreds of streams. Go with me to northern Ontario! In this wonderland you would have the task of your life to make a record of all the lakes, rivers, and streams.

The whole back-country of settled Ontario is one great maze of lakes, streams, and forests. It is too rocky, for the most part, to have attracted agricultural settlers, excepting a comparatively few of the typical Ontario pioneers, who are

always found on the outskirts of a lumbering country. Lakes of all shapes and sizes, full of beautiful wooded islands form the characteristic feature of this wondrous wilderness. Camping places abound on the clean sand beaches between the water's edge and the upward climbing forests behind.

Equally interesting is a visit to the Lake of Bays region of Ontario. The great secret of the success, and ever-increasing popularity, of these northern resorts lies in the fact that everyone who shoots, rests, or recreates here, becomes a travelling advertisement for the north country.

In the Algonquin Provincial Park, Canada possesses a virgin wilderness within striking distance of civilization and city life. The area of the park is, roughly, two and a half million acres. The whole is heavily wooded, and wild life within its borders has increased so wonderfully that it is hardly possible to walk a quarter of a mile along a bush road without sighting red deer, or other forest denizens. Beside almost every open lake or stream one comes upon busy beaver colonies, either at work or at play. Mink scurry busily about on rock ledges, while little red squirrels flit from tree to tree, and are so tame that they will come right up to your camp, to become acquainted with your biscuit tin. There are birds of almost every species, from the ocean sea-gull to the timid robin, the loon, and the hermit thrush. If one penetrates well into these wilds, one may hear the howl of the wolf, and feast one's eyes upon an occasional moose or otter.

There are over a thousand beautiful lakes within this one reserve. These lakes furnish the sportsman with the finest trout and bass, and other fresh-water fishing the heart could desire. Every winter pastime is possible here. There are long snowshoe tramps. There are hills for tobogganing and ski-jumping, and always a lake nearby for ice-skating.

I would like to talk about the Manitoba duck shooting, but fear that the space allotted to me is exhausted. I recollect one memorable occasion when, as the guest of the late Senator Kirchhoffer, who entertained His Majesty the King at a duck shoot, such a tremendous bag was made in the early morning, that if I mentioned the thousands of ducks slain I would not be believed, so I shall reluctantly be compelled to reserve the story.

THE NEWCOMERS

WHAT CANADA OFFERS THE SETTLER

By W. D. SCOTT*

The future of Canada—the Dominion's eventual greatness—must necessarily depend, to a considerable extent upon its immigration. Our country is not fulfilling its duty to itself, or to the world at large, if its natural resources remain undeveloped, or only partially opened up. Hundreds of years would necessarily elapse before our wheat-producing and mixed farming areas could be properly placed under cultivation, and our live stock industry brought to its maximum of production by our present population, and their descendants. Without the aid of incoming settlers, our minerals would remain unmined, our forests and pulpwood uncut, and we would be compelled to import innumerable articles of daily use, which, with the aid of willing hands from the Mother Country, could, and should, be manufactured within the Dominion. As in production, so in commerce generally, the new arrivals have played, are playing, and will continue to play, an ever-increasing part.

Material progress is only one phase of the development of a nation; there are other considerations of more vital moment, and of these the "make-up" of the nation is of paramount importance. Our views upon political, sociological, or economic problems may suddenly shift, or slowly veer, in any direction, and in so far as those questions are affected by legislation, it remains within the power of Canadians, through their parliamentary representatives, to have their views, as finally arrived at, carried into effect. With immigration the situation is, and must be, entirely different. Those who come

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from other lands to make their home in Canada—through their descendants, together with those of the Canadians of to-day—will form the Canadian nation of the future. Wherefore, it behoves us, while securing the requisite *quantity*, ever to bear in mind that the *quality* of our immigration must be the first consideration.

Speaking from an ethnological standpoint, no class of immigrant is considered suitable to Canada which will not assimilate with Canadians, and aid in building up a united nation, nor is, nor should be, immigration encouraged of races whose presence in numbers would tend to the lowering of our economic standards.

As to the occupations of new settlers, it may be stated that Canada, being primarily an agricultural country, tillers of the soil are those mainly required.

Given even the limited means necessary to enable them to commence operations, unlimited opportunities await the practical agriculturist, and the soldier-farmer, ready and willing to study and master local conditions.

Millions of acres of good land—ranging from free grants upwards to several dollars per acre, according to locality and position—are available. At least, one corporation, owning considerable tracts of land, takes an almost paternal interest in those settling on its property, giving them several years in which to pay for their farms, and in some cases assisting them with the means wherewith to erect buildings, and even in the purchase of live stock, as well.

Markets are growing, and will continue to grow. Co-operation among the farmers themselves will, slowly, but surely increase their profits, and with growing exports, added to increasing consumption within the Dominion, Canada can well support an enormous farming population in comfort and prosperity.

Practical farm hands will be able to obtain employment with those farmers owning more land or live stock than they are able themselves to manage. At present, however, there is a limit to the numbers that can be thus employed.

During the past decade an abnormal amount of railway construction has been under way. Practically two transcontinental lines have been built, in addition to the double-track-

ing of a large portion of a third system, and the construction of hundreds of miles of branch lines. This work has provided employment for thousands of the navvy, or labouring class, drawn largely from Italy and Austria, and, to a smaller extent, from the Motherland and other European countries. With the virtual completion of the work mentioned, a readjustment of the labour supply must take place, and Canada will no longer be able to absorb this class of settler in large numbers. New railway lines will, of course, be built from year to year, but never, in all probability, to the extent witnessed in the past ten or twelve years.

Economic conditions govern the movement of people from one country to another. Periods of depression, in overcrowded lands, force movements of those desiring work to other places, while, on the other hand, periods of rapid development in new countries act as lode-stars to those desirous of bettering their condition. The latter reason accounts largely for the immense influx into the Dominion during recent years, the statistics of which are as follows:—

Year	British	Continental	U.S.A.	Total
1905.....	65,317	36,213	44,424	145,954
1906.....	97,757	54,504	63,651	215,912
1907.....	132,060	88,765	56,548	277,373
1908.....	55,727	35,849	57,124	148,700
1909.....	52,344	40,941	90,996	184,281
1910.....	112,638	65,851	124,602	303,091
1911.....	144,076	75,184	131,114	350,374
1912.....	145,859	109,802	140,143	395,804
1913.....	156,984	146,103	115,751	418,838
1914.....	49,879	50,392	68,659	168,930
10 years ...	1,012,641	703,604	893,012	2,609,257

The absorption, during a decade, of such a large number of new arrivals is no small task. In furnishing employment, factories were built, virgin land was converted into farms, and, to provide them with shelter, hundreds of thousands of new homes were erected. This required capital. Brains, muscle, and money, constitute the trinity necessary for the development of a new country. Under the ordinary conditions of past years, those with funds for investment have kept Canada's wants in this respect fairly well supplied. The financial stringency of 1907 and 1908 resulted in a temporary

curtailment of expansion, and, as may be noted from the foregoing table, a rapid decrease in immigration.

With the outbreak of war, the immigration situation was immediately and entirely changed. The vessels which formerly carried westward their full quota of new settlers for a new land, and returned for more, now come empty, and return to Europe, carrying Canadians, under arms, prepared to uphold, on the battlefield, the cause of liberty and justice. The capital which made possible the development, in a single generation, of the vast plains of our prairie provinces, now flows into the national treasury to support the armies of the Empire and her allies. Those who, in times of peace, constituted the peaceful army invading Canada, for the betterment of their own condition and the upbuilding of this part of the Empire, now are crowding the recruiting stations, training in military camps, or are in the trenches.

These conditions, and other economic changes arising therefrom, have resulted in the practical discontinuance, for the time being, of British, and other European, migration. Our immigration from the United States has consisted largely of farmers, with sufficient capital and experience forthwith to engage in agricultural operations, and a vigorous propaganda is still being carried on to induce the continuance of the inflow of this class of settler.

When the cause of right has triumphed, and the present struggle has been brought to a successful termination, Canada's attitude on the question of immigration will require careful consideration. Many Canadian concerns now engaged in the manufacture of war munitions will, immediately upon the declaration of peace, materially reduce their staffs, which, together with the disbanding of soldiers, will throw large numbers, temporarily, upon the labour market. When, after the termination of the war, capital flows into the country in sufficient quantity, continual expansion will absorb this oversupply. This inflow of capital will eventually result in a return to the conditions that held prior to the outbreak of hostilities. In the meantime farmers with sufficient capital to enable them to commence agricultural operations on their own account will, as in the past, find a warm welcome and unbounded opportunities in the Dominion.

THE DOMINION'S INDUSTRIAL FUTURE

BY THEO. H. WARDLEWORTH, F.L.S.*

There is a fascinating interest in reading accounts of the conditions under which our forefathers began their new life in the Canadian wilds—how they had to adapt themselves to new surroundings and extemporize from the material at hand the implements, tools, clothing, and shelter they needed; how they made their harrows and rakes with the teeth of hickory wood; tanned their own leather; made their own boots; spun and wove wool into garments; made soap with the potash leached from burnt wood ashes. Nearly everything they needed for the farm and home was produced by these hardy forerunners of the great Dominion, down to less than a hundred years ago.

To-day, all is changed. The railways have spread in every direction, carrying the product of the factory to the wilderness, and bringing to the mart the wealth of the farm and forest. Labour has become specialized, and huge factories have sprung up, calling for skilled labour and great outlay of capital. The railways have not only been carriers; in their progress they have opened up unsuspected mineral wealth of coal, iron, and other ores, and these have formed the basis of many of our largest industries.

Much as the railways have done, they are to-day a problem, for, bright as the future of Canada appears to be, there will always be one grave question of major importance, and that is transportation. Four thousand miles from coast to coast

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has to be covered; many of our minerals are widely scattered, and they must be brought to centres where coal and labour are available. To bring together materials and labour so that they can be utilized to the best advantage will constitute a problem which will tax the wisdom of our transportation experts, and the government. That it can be solved is demonstrated by the experience of other countries. Not to such an extent as we have to face, it must be admitted. Still, the example has been set, and what other nations have done, surely Canada can do. Special facilities might have to be accorded to industries, which otherwise would be handicapped, and possibly killed, by too heavy transportation charges. New discoveries in the far North-West show clearly that the great treasures of the earth now being laid bare will be without value, unless the question of carriage from west to east can be satisfactorily solved.

Electric energy, with which, as a country, Canada is so bountifully supplied, must be a potent factor in the development of many electro-chemical industries. This agent alone will be responsible for the bulk of our new openings for fresh products in the realm of chemistry. The ramifications possible in the making of synthetic products, by the employment of carbide of calcium alone, are practically without end. Large extensions of our synthetic output are bound to come from this source alone, which is peculiarly an electro-chemical one.

Scientific research is fundamental to our continued success in the field of industry. It is demonstrated beyond question, that the countries which have developed their resources most successfully have done so by regular and steady devotion to research. This is done not only in the direction of new products, but particularly in improving old processes, utilizing by-products, and co-ordinating industries, so that the by-product of one becomes the staple of another. In this way nothing is lost in material or energy. Only by the close co-operation of science and industry can the best results be achieved. Our government is willing, and anxious to further this, while our universities gladly offer their facilities and talent to the same end.

When such a research system is organized and set to work,

who can foretell the vast strides which will be made in the working up of our clays, our iron, our magnesite, and other raw materials. Such an organization of research would be a source of strength to the country. It would open careers to our young men: encourage them to devote their talents and energy to building up Canada, rather than going elsewhere to give the best years of their life to foreign countries, which at present offer them greater inducements.

Canada has already been able to contribute many new factors to the world; what could she not do under such a system of organized and specialized industries?

One of the means by which the forces of industry and science could be joined and fostered in the years to come would be by the establishment of an institution akin to the excellent Mellon Institute of Pittsburgh. Here the perplexing questions of the manufacturers are studied, and, in many cases, answered. This Institute owes its origin to a Canadian, Dr. Kennedy Duncan. It has contributed enormously to the wealth and well-being of the United States, by the valuable help it has given to the baking and other trades, to the refining of oils, prevention of smoke in cities, recovery of ores, hydrogenation of oils, *i.e.*, converting them into fats, utilizing leather waste, and making other by-products of the factories valuable.

Here is an opportunity for some of our wealthy men to hand their names down to posterity, and confer benefits on the Dominion, not to be estimated in dollars, and, indeed, difficult of realization in other directions.

Also, our government might call into being an institution similar in work and aims to the Bureau of Standards, in Washington, D.C., where all matters affecting measures of weight, length, and bulk, colours, stresses, strains, and cognate subjects are dealt with and standardized. The bureau has recently fixed standards for electric light, cement, paper, and even the colour of butter. These are only a very few of the matters undertaken and settled by the bureau, and they are only finally fixed after thousands of experiments, and the most exhaustive research. Such an institution could be started with comparatively small expense, and would soon demonstrate its value and usefulness.

The Canadian Government has made an important and progressive move by the formation of a Department of Forestry Products, in connection with McGill University. This department devotes its attention to all problems affecting our vast timber resources, such as paper-making, the production of wood-alcohol, formaldehyde, acetic acid, acetates, acetone, charcoal, and fibre products. The power for good that such an institution can exert in the future of the industries affected cannot be estimated, and the Government is to be heartily congratulated on its creation of the department.

As an indication of the impulse given to investigation in new fields, it may be cited that in the United States, up to the outbreak of the great war, all the curved face-glasses of clocks and watches came from Germany. The importations ceased, and the manufacturers of clocks and watches consulted with the leading glass-makers in the United States. Within a month, curved discs were being produced. In less than another month the cost of production had been reduced to a figure less than the German price ruling before the war. Another instance is found in the small, fine, paint brushes for water-colour work, which formerly came from Germany. The brush manufacturers in the United States found that they could produce these brushes, procuring the necessary fine hair from the inside of the ears of cattle killed in the Chicago slaughter-houses.

Nor have our Canadian manufacturers been idle. During the first year of the war, many new manufactures were started, in some cases utilizing raw materials hitherto undeveloped, or little used. In a few instances existing industries have been greatly improved and developed. The breadth of the field covered may be gauged by the inclusion of the following: high carbon steel, manganese steel, molybdenum, zinc, steel drums, pyrometers, detachable chain and chain belting, drawn tungsten wire, accumulators, milling machinery, wire-weaving machinery, sand blasts, automatic wrapping machinery, aluminum lasts, toys of metal and wood, wire tag fasteners, wire collar supports, light metal wares such as clips and buttons, fancy pencil movements, lamp lenses, window glass, glass syphon vases, potash, cyanides, ether,

amyl acetate, reclaimed rubber, oxygen and hydrogen, acid-resisting varnish, medical specifics, tonic wine, grape juice, bakers' and confectioners' malt supplies, parchmentine and glassine paper, hollow turned wood boxes, pulp and paper, leather, sugar, chains, woodenware, tungsten lamps, enamelled ware, wood distillation products, abrasives, electro metals, carbon electrodes, carbide, ice and refrigerating machinery, augurs and bits, casters, drapery hardware, and office supplies. Munitions, too, merit reference, one concern in Montreal alone having received contracts to the tune of \$150,000,000. The total war contracts placed in Canada have exceeded the sum of one and a half billion dollars.

For some years prior to the war antimony had been produced in New Brunswick, but owing to the low prices ruling for a considerable period before the outbreak of hostilities the mines had been closed down. The plant was some distance from a railway, and the ore contained a percentage of arsenic, which was objectionable. Recently the price of antimony advanced very materially, and as the mines are now within easy reach of a railway, the only question affecting the re-opening and renewal of operations was the presence of the arsenic. This problem was put before a chemical engineer in Montreal. In a few weeks the difficulty was solved by a new process, evolved by the chemist, and now the antimony can be produced, of fine quality, arsenic free, at a price to compete with other sources.

In the iron and steel industries enormous progress may be looked for. We are now making high carbon steel and manganese steel. There are yet other kinds of steel we do not make, notably, the steel for producing special magnetos for aeroplanes; no doubt our metallurgists will give us this at no distant date.

In the branches of industry affecting the rarer metals, we are now turning out magnesium metal. Tungsten drawn wire for electric lamps is a living Canadian industry. Molybdenum is to-day a commercial product of Canada. Twelve months ago not one of these metals was produced.

We may reasonably look for an extension of our production of zinc. Within the past year, our metallurgists have overcome many obstacles presented by the character of our zinc ores.

Already large plants in British Columbia are beginning to produce this metal on a paying basis, and new works are being established in other parts of the Dominion.

Locked up in our enormous deposits of feldspar we have stores of potash, which would supply our factories and enrich our fields for years to come; the key to the utilization of this wealth has yet to be found. Most probably it will come to us in a combination of the cement industry coupled with the out-turn of potash as a by-product. This is a question for our scientists to answer, and it is well worth answering.

The vexed question of our ability, in the future, to make aniline dyes and synthetic medicines is not readily answered. We can say, however, that, since the war, we have successfully commenced the recovery of benzol and toluol as by-products from our coke ovens. As a sequence to this we are now making, commercially, in Canada aniline oil, a valuable "intermediate" in the production of synthetic dyes. Nitrobenzol, or artificial essential oil of almonds, is also being manufactured. One of the most valuable of the recent additions to materia medica—formerly made only in Germany and Switzerland—from either benzol or carbolic acid as a base, is, at the present time, made in Montreal. Who is to say that we shall not gradually extend the field of production, and be, in a large measure, independent of outside sources for many of our dyes and synthetic thereapeutic agents?

All that may be done in the Dominion for the systematizing of our industries will be handicapped seriously, if we cannot secure from our government some measure by which the use of ethyl-alcohol can be secured free from duty for manufacturing purposes. Very few realize how important this factor is in the encouragement of research, and in building up trades dependent upon pure alcohol for full expansion. All interested in the future of Canada should endeavour to have such legislation passed as will secure the extended use of alcohol for manufacturing purposes. Duty-free alcohol has had untold influence in other countries, in building up the chemical trade in particular, and many others generally.

One of the phenomenal features of the past two years has been the readiness with which our various factories have been adapted to the requirements of making munitions. New

machinery of a type not hitherto used in Canada had to be installed. It was successfully made, and put into operation, resulting in vast quantities of war munitions of all descriptions being turned out with satisfaction and speed. It may be safely assumed that our workshops will be as quickly readjusted when the reconstruction period arrives.

When the position of Canadian industry to-day is considered, it must be confessed that our experiences, since the outbreak of war, constitute the brightest of auguries for the Dominion's manufacturing future, as it shows in no unmistakable way the initiation, versatility, and energy of the Canadian people.

PRESERVATION OF NATURAL ASSETS

THE WORK OF CONSERVATION IN CANADA

BY JAMES WHITE, C.E., F.R.G.S., F.R.S.C.*

In a young country, with large resources, and with unlimited opportunities, it is not a matter for surprise that past generations of Canadians have been extravagant in the administration of their birthright. Awakening, as she has to her advantages, however, Canada has commenced to appreciate what her natural resources represent, both to the present generation and to posterity. It remained, therefore, for the Government of Canada, in 1909, to take steps to conserve these resources, and in that year the Act of Parliament constituting the Commission of Conservation was passed.

The Commission is composed of twenty honorary members, including a representative from a University in each province, together with the Minister of Agriculture, the Minister of the Interior and the Minister of Mines of the Dominion Government, and the member of each provincial government in Canada who is charged with the administration of the natural resources of such province, as members *ex-officio*.

Sir Clifford Sifton, Minister of the Interior in the first Cabinet of Sir Wilfrid Laurier, was appointed chairman. A leader with a wider breadth of vision or with a better grasp of Canadian conditions, could not have been obtained.

The writer, then Chief Geographer of the Department of

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the Interior and a student of Canada's resources, was appointed to the position of secretary and, three years later, promoted to deputy head.

The Act defines the duties of the Commission as follows:—"To take into consideration all questions which may be brought to its notice relating to the Conservation and better utilization of the natural resources of Canada, to make such inventories, collect and disseminate such information, conduct such investigations inside and outside of Canada, and form such recommendations as seem conducive to the accomplishment of that end."

The Commission has always taken a broad view of its functions and of what is meant by the term "natural resources." Under this interpretation the work of the Commission has covered investigations into all subjects pertaining to natural resources, as well as to the welfare of the people. In his inaugural address in 1910 the chairman said:—"The physical strength of the people is the resource from which all others derive value. Extreme and scrupulous regard for the lives and health of the population may be taken as the best criterion of the degree of real civilization and refinement to which a country has attained."

Working upon this basis, one of the committees, into which the Commission is subdivided, is taking active measures towards better conditions in housing and town-planning. That it might be assured of the best advice in its work the Committee on Public Health secured the services of Mr. Thomas Adams, late Senior Adviser to the local Government Board of Great Britain.

While, owing to the European war, present conditions are not altogether favourable to the initiation of extensive town-planning schemes, the movement has been taken up by the several provinces. Some of the provinces already have Town Planning Acts on the statute books, but lack the necessary machinery to make them operative. Other provinces are utilizing the services of the Commission's adviser in the draughting of Housing and Town Planning Acts, to the end that, when put into effect, they will be alike efficient and workable, and, at the same time, acceptable to the interests most concerned.

The Committee on Lands, of the Commission, has been exceedingly active in the work of educating Canadian farmers to the advantages of conducting their farms on more scientific lines. Under Dr. J. W. Robertson, as chairman of this committee, one of the most far-sighted movements ever initiated by a public body was inaugurated in what are termed the "Illustration Farms". These were privately-owned farms, in different sections of the country, selected by the representatives of the Commission, after consultation with the farmers of the district. The owners of the selected farms agreed to conduct them in accordance with the advice of the instructors of the Commission. The main advantage of these farms to the farmer is in the fact that in their operation the principle is adopted of taking the demonstration farm to the farmer, instead of expecting the farmer to visit the experimental farms. Splendid results have been secured to the farmers, in largely increased yields, and, as these increases are secured without increased cost, the additional product has been all profit. Having secured such satisfactory results, and realizing that, if the work were to be further extended, it must be carried forward by a department with administrative power, the illustration farms have been transferred to the Department of Agriculture, which will conduct them along similar lines.

In addition to the illustration farms, the Committee on Lands has carried on a general survey of farming conditions. In 1911-12, one thousand farms, and, in 1913-14, eleven hundred farms, were included in this survey. In this investigation, the conditions enquired into were those of areas under cultivation, rotation of crops, seed selection and treatment, disposal of crops, use of manures, use of power, farm labour, water supply, and conveniences in the farm home. The results of these surveys have been published in the annual reports of the Commission and show some conditions which require attention. Especially is this the case with farm weeds, which, in almost every province, appear to be on the increase.

Having concluded its work in the operation of the illustration farms, the Lands Committee now purpose turning attention to what might be termed a county survey. The

investigation will include, among other conditions, the following:—

The obtaining of information regarding general agricultural conditions; the roads and transportation facilities in the county; the condition of the rural schools, as regards agriculture, school gardens, etc.; the labour problem, with reference to the difficulties presented, and the means being adopted to overcome them; the social life in the community, and kindred phases of the agricultural problem. It is hoped to be able, after the investigation, to co-ordinate all of the available existing forces and organizations for the improvement of agriculture in this one community, and thus to make it more or less of a demonstration or illustration county. Some counties have good roads, others have school gardens in connection with their rural schools, while still other counties have one or other of the various means of improvement in agriculture, operating in their county. It is hoped to be able to put into operation all these various organized forces in one county, to ascertain what effect and improvement will result therefrom.

The Commission, through its Committee on Mines, undertook an investigation of the coal resources of Canada, and the results of this investigation have been incorporated in a report on "Conservation of Coal in Canada." Information secured in this investigation has led the Commission to advocate the appointment of a chief inspector of mines, who will pass upon the mine-working plans of all companies operating coal lands under Dominion Government leases in Manitoba, Saskatchewan, Alberta, and the Territories, to ensure the operation of the mines with the least possible waste of coal.

The Commission is also advocating the adoption of legislation making it compulsory to record the location of all bore-holes, the filing of bore-hole records, and the capping of abandoned natural gas wells, and is also giving encouragement to the extension of mine-rescue and first-aid work in the mining industry.

The Commission is conducting a power survey of the industries of Canada. The object sought is the securing of information respecting the sources of power, the amount used, and the cost. It is hoped to secure, through this means, in-

formation which will assist in the solution of Canada's fuel problem. Respecting coal, Canada is peculiarly situated. While possessed of abundant supplies in both extreme eastern and western sections, for approximately 1,750 miles, in central Canada she is almost entirely dependent upon the United States. This condition, while, at present, causing no inconvenience, apart from the high cost in the western sections, is unsatisfactory, in that, with the rapidly depleting supply of anthracite coal in the United States, the day may not be far distant when its export will be prohibited.

Canada is, however, richly endowed with what has been termed "white coal", or water-power possibilities. Owing to the geological formation of the Dominion, the central portion, including an area of approximately two million square miles, has an average elevation of about 1,500 feet above sea level. The drainage from this watershed, uniting into rivers on the way down to sea level, develops innumerable waterfalls. The same may be said of the eastern and western sections of the Dominion, where there are ranges of mountains, or mountainous country, whose drainage similarly creates waterfalls. Until comparatively recently, there was a lack of appreciation of these water-powers, but, with the advances made in the transmission of electrical energy, has come the demand for their development. That these natural resources should be properly conserved, for the general benefit of Canadians, the Commission of Conservation undertook an exhaustive investigation, covering the entire Dominion. Under the title, "Water-powers of Canada", the Commission published, in 1911, a report giving the result of the investigation of the water-powers of eastern Canada, and a general outline of some of those of western Canada. There is now on the press a report on the "Water-powers of Manitoba, Saskatchewan, and Alberta," while a report covering the water-powers of British Columbia is in course of preparation. The development of water-power in Canada has made rapid headway within a few years, and nearly every city and town in Ontario, Quebec, Manitoba, and British Columbia, is supplied with electric light and power through hydro-electric development. It will thus be seen how important it is that these sources of power should be carefully conserved.

Not only is this necessary in order that the present uses of this power may be maintained, but, as before stated, the time does not seem far distant when Canadians of the central provinces may have to depend upon their water-powers to take the place of the fuel now used for heating and power purposes.

In the past it has been generally accepted as a fact that Canada possesses an inexhaustible supply of timber; that notwithstanding the destruction wrought by the extravagant forestry methods practised, and the devastating forest fires, the supply of timber will continue to be available. A careful study of existing records, however, conclusively shows that, so far from being inexhaustible, the reserves of merchantable timber, of what may be termed soft wood, in the forests of Canada, are very limited. In fact, with a continuance of present destructive methods the supply of timber will, in a comparatively few years, be barely sufficient to supply the needs of Canadians themselves. The Commission on Conservation has, therefore, been conducting a careful survey for the purpose of making an inventory of the remaining timber reserves. With this accurate information in its possession, it will be in a position to suggest to the government a policy of management of the forest, looking to intelligent forestry methods and proper protection from fire.

The Commission has also been instrumental in securing the setting apart by the government of large areas as forest reserves, for the conservation of the timber resources contained therein, as well as the protection of the forest cover of the watersheds of rivers having their sources in these regions.

A special feature of the forest protection work of the Commission was the securing of the co-operation of the Board of Railway Commissioners of Canada in the enforcement of fire preventive measures by railways along their lines. The Canadian railways have met this action in a friendly spirit, and excellent results have been secured.

The Commission has given careful consideration to the subject of reforestation. Especially is this the case with a section of central Ontario, known as the Trent watershed, where, after a very careful survey and inspection, it has been recommended that this area be secured by the Dominion Govern-

ment for reafforestation and setting apart as a forest reserve. The government is especially interested in this district, inasmuch as it is traversed by the Trent Canal, the feeders of which take their rise in this watershed.

Other issues which claim the attention of the Commission are the development and protection of Canada's fisheries and fur-bearing animals. In recent years the breeding in captivity of fur-bearing animals has made rapid strides. A review of this industry has been published in the report entitled, "Fur-Farming in Canada"—a unique publication—and great interest has thus been created.

The work of education along fire prevention lines, of safety from accidents in our industries and on our transportation lines, and the public health, have each been given careful attention by the Commission, in the interests of the people of Canada.

That the conservation of natural resources means hoarding them for the use of future generations is a common misconception. In fact, with the exception of her minerals, Canada's natural resources will, if properly worked and developed, increase in value, and yield not only to the present generation good returns, but be handed down to future generations in a more highly prosperous condition. With nature's gifts, each generation is entitled to the interest on natural capital, but the principal should be continued unimpaired to posterity.

It cannot be too clearly understood, however, that the functions of the Commission of Conservation are wholly of an advisory nature. In this capacity it endeavours, by carrying on an extensive publicity campaign, to educate public opinion along the lines before suggested. By careful and accurate reports and observations it has earned the confidence, both of administrative and public bodies, and its advice is almost universally sought and accepted.

Respecting the scope and general work of the Commission the words of Sir Clifford Sifton, at the fifth annual meeting, are peculiarly apt. He said:—

"It cannot be too often repeated that it is not the duty of this Commission to act in an executive capacity or to exercise the functions of any department of government, Provincial

or Dominion. Our duty is to investigate, enquire, advise, and inform. While in so doing, it will occasionally become necessary for us to do things which might be regarded as possibly falling within the function of a governmental department, we should never carry this work to a greater length than is necessary to arouse interest in it, to point a way to improvement, and, in some cases, to collect the information necessary to the formation of intelligent judgment. While in each particular case that arises, there must be an exercise of judgment on our part, the above are the general lines upon which we must act.

"It is gratifying to know that, as the result of adhering closely to these rules, we have been enabled to proceed with important studies and investigations, to take steps for the protection of the public interests, sometimes in antagonism to important interests and influences, and yet we have not, so far as I am able to discern, aroused antagonism in any considerable section of the community. On the contrary, our work is encouraged and assisted almost universally by the various public bodies and representative institutions throughout Canada."

THE DAIRYING INDUSTRY AND ITS FUTURE

By J. A. RUDDICK *

It will help us to arrive at a clearer estimate of the future of the dairying industry in Canada if we consider, first, very briefly, some features of its present state.

The latest actual statistics of milch cows, and total production, are those which are to be found in the Census of 1911. In that year, the total number of cows was 2,594,179, an increase of seven per cent., or only 185,502 cows, in ten years. The increase in production during the same period was forty-three per cent., the wide difference between the increase in the number of cows, and the increase in production, being due to improvement in the milk-giving qualities of the cows, and to better feeding and care. The increase in numbers was all in the western provinces, and the largest increase in production per head was in the Province of Ontario.

The total value of milk, and its product, produced in Canada, during 1910, was as follows:—

Factory cheese	\$ 21,587,124
Home-made cheese	153,036
Creamery butter	15,645,845
Home-made butter	39,889,953
Condensed milk	1,813,971
Milk and cream consumed and used for ice cream	30,250,005
	<hr/>
	\$109,339,934

The production of butter increases steadily year by year, and the consumption of milk and cream has, likewise, shown

*John Archibald Ruddick: born 1862; Superintendent Allengrove combination of cheese factories, 1883-8; Instructor for the Dairymen's Association of Eastern Ontario, 1888-9; Superintendent, Dairy School, Kingston, 1894-8; Dairy Commissioner, New Zealand, 1898-1900; Chief of Dairy Division, Dept. Agriculture, Ottawa, 1900-4; Dominion Dairy Commissioner since 1905. "His name will go down in dairy history as one of its leaders".

very marked increases, but this expansion has been partly a result of a diversion of milk from the cheese factories, and, consequently, the production of cheese has declined.

The latest returns show that there are 3,760 cheese factories and creameries, and twelve condensed milk and milk powder plants in Canada. Of this number, 3,500 are in the Provinces of Ontario and Quebec, and the other 272 establishments are fairly evenly distributed throughout the other provinces.

THE FUTURE OF PRODUCTION. There has been a steady increase in the production of milk in Canada for many years, and there is no reason to believe that this increase will not continue. For some years past, as already stated, the increased production of milk has been due to improvement in the stock, rather than to increased numbers. There is, however, every indication that the increase in production will be accelerated in the future, owing to the larger number of cows being kept, in addition to continued improvement in the yield. The cow-testing movement, which has been encouraged by a vigorous propaganda on the part of the Dairy Division, at Ottawa, is already producing important results. Many farmers now realize that it is possible to increase the average yield of milk in Canada by at least fifty per cent., and that without increasing the number of cows. The number, however, will be considerably increased in some parts of the country, especially in the Prairie Provinces—possibly also in New Brunswick and Nova Scotia. The excitement in the cereal market, owing to the war, is rather discouraging to the live stock industry, but this is merely a temporary state of affairs, and there is a strong tendency, even in the Prairie Provinces, to engage more extensively in mixed farming. There is every reason to believe that Manitoba, and certain parts of Alberta and Saskatchewan, will produce enormous quantities of dairy produce. It is even well within the possibilities that the chief seat of the industry may eventually be transferred to that part of Canada.

The creamery industry is expanding rapidly in the Province of Nova Scotia, and the better returns to the farmers is encouraging greater attention to the dairying industry, and indications are not wanting that there will be considerable growth

in the future. Nova Scotia and other sections of the Maritime Provinces offer excellent opportunities for successful dairy farming.

THE EXPORT TRADE. Small quantities of butter and cheese have been exported from Canada for over a hundred years, but it was not until about the middle of the nineteenth century that a regular trade of any importance was established. The maximum export of 34,128,944 lbs. of butter was reached in 1903, and the largest export of cheese, namely, 233,980,716 lbs., was in the year 1904. Subsequent to 1907, a rapid decline took place in the quantity of butter exported, until, in the fiscal year which ended March 31st, 1913, less than one million lbs. were exported to all countries, and for the first time in over sixty years practically no butter was shipped to Great Britain, the actual quantity being only 681 lbs. During the year 1914 there was some revival of butter exports. The figures for nine months ending December, 1914, totalled 2,283,197 lbs. The following year—ending December 31st, 1915—reached a total of 3,592,791 lbs. in weight, and \$1,059,764 in value. The exports of cheese for the fiscal year, which ended March 31st, 1915, were 144,478,340 lbs., and for the following nine months (to December 31st) the weight totalled 157,166,196 lbs., and the value, \$24,536,994. In the year 1900, 37 per cent. of the entire dairy production was exported, while in 1910 the exports were only 21 per cent. of the total production. The decline in the exports of dairy products, in the face of the increase in the production of milk, is partly the result of a larger per capita home consumption (30 per cent. in ten years), owing to the prosperous condition of the people, but it is chiefly due to the large growth in population during the past ten years.

There is reason to believe that the increased production will very shortly overtake the increase in home consumption, and thus check the decline in the export trade. It would not be surprising if the quantity of cheese for export should show some increase in the next few years, especially as the war has practically stopped immigration. Much will depend on what happens in this connection after the war is over, but the writer does not look to see much further decline in the export of dairy produce from Canada in the near future.

Canadians are well equipped to prosecute the business of dairying. The chief obstacle at present in the way of extension is probably the scarcity of labour for milkers, but farm labour conditions are undergoing change, and readjustment, and, in time, a more permanent and reliable supply will be secured, especially when farmers provide cottage homes for married men. It is also conceivable that the milking machine, which is gradually coming into use, may help to solve the labour problem on dairy farms in Canada, as it has done in Australia and New Zealand.

On the manufacturing side, the cheesemakers and the buttermakers are well trained, thanks to the excellent dairy schools which the various provincial governments have established. This is particularly true of the cheesemakers, who have more skill in the theory and practice of their art than those of any other country in the world.

In consequence of this high degree of technical knowledge, Canadian cheese is in a class by itself, and finds the highest favour in the markets of the United Kingdom, where a much larger quantity would be warmly welcomed. This is a valuable asset for the industry, and one which is not yet fully appreciated.

A development is taking place in the manufacturing of butter which deserves special mention. This refers to the city creamery. Already most towns and cities have one, and the larger centres several of these establishments. The manufacture of ice cream in these city creameries is becoming a very important branch of the industry, and one which is growing very rapidly. There are, indeed, several milk plants in which ice cream is the only article manufactured.

Facilities for training in the higher branches of milk technology are largely lacking at present, but this will be remedied before very long.

On the whole, the dairying industry is in a sound, healthy condition, and offers every inducement for those who are prepared to engage in it.

FIRE INSURANCE AN INDEX TO PROSPERITY

By T. L. MORRISEY *

It would, indeed, be difficult to find a truer index to the material growth of Canada than the steady increase in the volume of fire insurance reported to the Department of Finance at Ottawa.

Insurance on property presupposes property; therefore, the amount at risk held by the fire insurance companies operating within the territory may be taken as a reasonably safe guide in estimating the wealth of the community.

The Dominion of Canada came into being in the year 1867, and although the Fathers of Confederation overlooked specifically mentioning insurance as coming within the purview of the legislative powers of Parliament, nevertheless, the legislators of that day, sitting at Ottawa, appear to have had little doubt on the subject, since one of their earliest acts—Act 31, Vic., Cap. 48—related to insurance.

The first return to Parliament, under this Act, was presented at the second session of the first Parliament, covering the year 1868.

A perusal of this report now, in the light of later developments, proves very interesting reading.

The total amount of fire insurance in force on December 31st, 1868, was \$203,653,894, a sum, no doubt, considered by our sturdy forebears not to be despised. Possibly when we picture to ourselves what Canada was then—four provinces not yet connected up; the conditions of life, simple, as compared with the complex social existence of to-day, the then

* Thomas Louis Morrissey: born 1860; president, All Canada Fire Insurance Federation; past-president, Montreal Ins. Inst.; past-president, Can. Fire Underwriters' Ass'n. One of the leaders in the insurance world.

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chief sources of wealth being the four basic industries, agriculture, fishing, mining, and lumbering, the latter including the cognate industry, wooden shipbuilding—the great industrial development that has since taken place being still hidden in the womb of the future—we, too, can perceive why the modest figures of 1868, taken as an earnest of what was to come, amply justified the satisfaction of our forefathers.

The gradual expansion, and industrial development, of the country is reflected in the returns for succeeding years.

For the purpose of comparison, the amount at risk as at 31st December, 1868, and the corresponding figures for 1874, and at each quinquennium thereafter, are here given. These figures speak more eloquently than words:—

1868.....\$	203,653,894
1874.....	321,132,413
1879.....	407,357,985
1884.....	605,507,789
1889.....	694,538,378
1894.....	836,067,202
1899.....	936,869,668
1904.....	1,215,013,931
1909.....	1,863,276,504
1914.....	3,456,019,009

The population of Canada in 1868 was probably around 3,250,000 (census, 1871, 3,485,761). To-day it is, roughly, 8,000,000 (census, 1911, 7,206,643). Thus, while the population has increased less than two and a half times, the fire insurance on property, as reported to the department at Ottawa, increased seventeen times.

It must be borne in mind that the figures quoted, being merely for the purpose of comparison, are, of necessity, limited to the amount carried by companies licensed by the Dominion Government, since no others are available for the earlier period. The control of insurance, unlike banking, has never been assumed solely by the Dominion. The provinces have also granted charters and licensed companies to carry on the business of insurance within their respective borders, and the volume of business so written by such companies, as compiled from latest available reports (Ontario, 1913) reaches the very respectable total of \$753,078,617.

This is not all. Under the Insurance Act of Canada,

paradoxical as it may seem, insurance with unlicensed companies—having no legal status in the country—is permitted; persons placing insurance with such companies are merely required to make a return of same to the superintendent of insurance.

The insurance placed with unlicensed companies, as reported for 1914, amounted to \$219,743,335, which, while a sensible reduction from that reported for the preceding year, is still considerably in excess of the amount at risk of all companies in 1868.

Taking the amounts for the three classes of companies, we find:—

Dominion companies	\$ 3,456,019,009
Provincial companies	753,078,617
Unlicensed companies	219,843,335
Grand total	\$ 4,428,840,961

Here we have a rough-and-ready method of arriving at the value of all our buildings, and movable property; dwellings and their contents; churches, schools, colleges; warehouses and stocks of merchandise; factories and machinery; farm buildings, implements, and live stock; grain and lumber; steamboats plying on inland waters; railway property, other than right-of-way; in short, property in every conceivable form liable to destruction by fire.

Having regard to the uninsured property, and property, though insured, under-insured, a fair estimate would be to place the insurance carried at 50 per cent. of the actual value, which would yield a sum of \$8,857,681,922, or well over \$1,000, for every man, woman, and child in the country.

The people of Canada are, likewise, forehanded; they have money in the bank, the amount standing to their credit in savings account as at 31st July, 1915, being no less than \$683,761,432. They carry life insurance to the extent of \$1,216,955,432, upon which they paid premiums (1914) of \$41,129,724.

Our wealth does not stop here. We have thirty thousand miles of railway; highways and bridges; municipal improvements, such as pavements, water, sewerage, and lighting systems, all contributing to the comforts of modern life. Our

interest in these may be only an equity, as the bondholders stand in the position of mortgagees, but the benefits accrue to us.

Then, to cap all, we have a very nice little parcel of real estate, its "metes and bounds" being as follows: on the north, the Arctic; on the east, the Atlantic; on the south, the 49th parallel of latitude; and on the west, the Pacific, comprising, in all, three and three-quarter million square miles, more or less, some of which has sold as high as \$128 per square foot.

Upon this estate is to be found a great diversity of natural resources: coal in abundance, east and west; minerals, base and precious; orchard and agricultural lands suitable for all kinds of farming and producing the finest wheat in the world; the largest forest reserves; fur-bearing animals; shores teeming with fish; rivers and lakes navigable to the heart of the continent; rivers not navigable, but possessing value as water-power, or hydro-electric, estimated at 20,000,000 horsepower, of which not 10 per cent. has been developed.

Climate is sometimes urged against us, but even this has its compensations; for, if it is cold in winter, may we not reckon amongst our most valued assets the longest hours of sunshine in summer? Old Sol, with an utter disregard of labour union maxims, does not hesitate to work overtime in the ripening of our crops.

To the climate may we not also attribute, in no small degree, the most valued asset of all—the strong, hardy, self-reliant, virile race engaged in the world task of building a nation on this northern half of the North American continent? The sons of Canada have proved their mettle upon every occasion that has arisen. The same spirit that prevailed in 1885, when the Rebellion in the North-West threatened their country, and again in 1899-1900, when they answered the call of Empire half way around the world to South Africa, is the spirit that asserted itself immediately the long-talked-of German peril crystallized itself into German attack upon their national life. The response of Canada was quick, and befitting the proud position she occupies amongst the free and self-governing communities forming that glorious Empire which stands for everything that makes for the uplift of mankind.

In the never-to-be-forgotten April days of the eventful year, 1915, when the torture of suspense spread like a pall over the country to its remotest corner, to be followed by the thrill of pride and exultation, as the story of the glorious deeds of the Canadians at Ypres and St. Julien gradually unfolded, a nation was born! There, upon the classic battle-ground of Europe, that witnessed the military operations of the mighty Caesar and his legions, and, down through the centuries, the struggles of various peoples for mastery! There, against the onslaughts of the greatest military organization the world has ever known, employing methods entirely novel in warfare, and, be it said to the everlasting disgrace of Germany, as despicable as novel, these new-found warriors of the twentieth century held fast, and, in the words of their illustrious commander-in-chief, "saved the situation".

May it not well be asked, where is there another eight million people as highly favoured as this eight million, another community possessed of the same per capita wealth, potential as well as in being? Should we not justly be proud of our heritage—*our* "place in the sun"—and forever be prepared to defend it to our last dollar, and our last man?

THE CLIMATE OF CANADA

By R. F. STUPART, F.R.S.C.*

For the purposes of this article, the writer has divided the Dominion into six portions, each of which possesses certain distinctive climatic characteristics, although, indeed, all of them display, each within its own boundaries, great variation of climate. These several areas are distinguished by the names, British Columbia, Western Provinces, the Great Lakes, the St. Lawrence Valley, the Maritime Provinces, and Northern Territories.

BRITISH COLUMBIA. The vast territory bordering on the Pacific between the same parallels of latitude as the British Isles, naturally has near the coast a climate which in many respects closely resembles that of Great Britain, but both on Vancouver Island, and quite near the main coast line, there are lofty mountains which lead to larger climatic differences in short distances than occur in the British Isles.

The outstanding feature of the coast regions is the mild winter, during which the mean temperature of the coldest months is above the freezing point. Next in order is the seasonal character of the rainfall conjoined to the fact that the annual amount is, except at a few points, decidedly heavy, and generally in excess of British rainfall. Along the outer coast of Vancouver Island, and thence northward, the annual precipitation exceeds 100 inches. Snow seldom falls in winter at places near the sea level, but the mountains, which are never far distant, are snow-covered.

We may take Victoria as representing the island climate as regards temperature, and Vancouver as representing the lower mainland, the latter having a slightly higher summer temperature than the former, but both conforming almost exactly

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with temperature curves belonging to many places in England. Further north, at Prince Rupert, the temperature agrees quite well with that of parts of Scotland. The chief difference between the coast climate and the English climate is in the monthly distribution of rainfall. In British Columbia copious rains are prevalent during autumn and winter, but towards May the rain quickly diminishes in amount and duration, and the summer months are singularly dry, with an abundance of sunshine, whereas, in Britain the rain is more uniformly distributed throughout the year.

Leaving the lowlands near the coast and passing to the eastern side of the coast ranges, we find interior plateaux where the climate differs materially from that nearer the sea, the winters being colder and the summers warmer, and the rainfall relatively scant, indeed, at some points irrigation is necessary for successful agriculture. The best known of these interior uplands are the Kamloops, the Okanagan, and the Kootenay districts, within which may be found good pasture lands, and lands suitable for mixed farming and fruit-growing. The January mean temperature in these regions, which lie south of latitude 51 degrees, is a few degrees higher than in Toronto, and there is a decided tendency for an earlier spring, which is well advanced before April. The day temperature is usually high, but the nights are cool, and the resulting average temperature differs but little from that of Toronto and Montreal. Temperatures of 90 degrees and upwards are not infrequent, especially at Kamloops, where 100 degrees occasionally occurs, while, on the other hand, 15 degrees to 20 degrees below zero is sometimes recorded in winter. As at the coast, the winter precipitation is greater than that of the summer, but the contrast is not so great, and the total annual amount ranges between 10 inches and 28 inches.

North of latitude 51 degrees, the interior plateau lands are mostly at a higher level, which, together with the higher latitude, leads to much colder winters and cooler summers than further south. The climate is, however, suitable for many forms of agriculture.

WESTERN PROVINCES. The general climatic characteristics of the Canadian prairie provinces are warm summers, cold winters, with little snow and no rain, and a fairly abundant

rainfall during the summer months. The most adverse features of the climate, and this particularly in Alberta, are the variableness of the winter temperature and of the summer rains from year to year. Observations extending over thirty years show that the mean temperature of a winter month at Calgary may range as low as 7 degrees below zero, while it may be as high as 26 degrees above. At Edmonton, it may be as low as 12 degrees below zero, or as high as 24 degrees above. The summer rainfall is usually sufficient for the most advantageous agriculture, but years of drought do occasionally occur in southern Alberta and southern Saskatchewan.

Spring opens a little earlier in Alberta near the mountains, and in south-western Saskatchewan, than it does further east, and in April the average maximum is 53 degrees at Calgary, 52 degrees at Edmonton, 58 degrees at Medicine Hat, and 47 degrees at Winnipeg. The rapid upward trend of the temperature curve continues during May and June, but more rapidly in the east than in the west, and the average day temperatures in July are as follows:—Calgary, 76 degrees; Edmonton, 73 degrees; Medicine Hat, 82 degrees; Prince Albert, 75 degrees; Regina, 76 degrees; Winnipeg, 78 degrees. Northward from the present wheat belt the opening of spring is later, but the average temperature in the Peace River district, and towards the Mackenzie, is but a little lower than in the more southern parts, and it is quite possible that with the longer days grain may germinate as rapidly. While the summer temperature is fairly equable throughout the Great West, not so the winter temperature. The average winter temperature decreases eastward from 17 degrees at Calgary, to 2 degrees at Winnipeg, and northward to 1 degree at Dunvegan and 9 below zero at Slave Lake.

The total annual precipitation in the west is not large, ranging from about 22 inches in Manitoba to 17 in northern Saskatchewan and Alberta, and about 13 inches in the more southern parts of these two latter provinces. Included in these amounts are snowfalls which range from 44 inches in Manitoba to 25 inches near Regina.

A feature of very pronounced importance in connection with the precipitation in the West is that in Manitoba 50 per cent., and further west over 60 per cent., of the annual total

falls between May and August, and June is the month of heaviest rainfall—just at the period when moisture is needed for the growing crops.

THE GREAT LAKES. The region of the Great Lakes, in the case of Canada, means the Province of Ontario, exclusive of its territory north of the main line of the Canadian Pacific Railway. The lake influence is more effective in the peninsula of Ontario than elsewhere, as Superior and Huron, in winter, largely temper the severe cold waves from the far North-West which sweep with unchecked severity over the north country, and then in summer all the lakes tend to equalize the temperature. Altitude is, of course, responsible for some climatic variation, as lands rising away from the various lake levels attain a height of 1,800 feet just south of the Georgian Bay, and 1,500 feet near the Upper Ottawa River.

The climate of the peninsula of Ontario is less subject to extremes of temperature than is any other part of the Dominion, exclusive of the British Columbia coast. The first part of March generally brings bright, sunshiny days and swelling buds, and together with the rapid disappearance of the snow, which then lies only in sheltered places, gives omen of spring which soon comes on apace. Light snowfalls occasionally occur in April, but this month, with a mean temperature of about 43 degrees, three inches of rain, and 190 hours of bright sunshine, is truly spring, and before the end of the month wild flowers are in bloom and the trees are leafing out. With a high percentage of sunshine and ample rain, vegetation makes rapid progress during May. Frosts are infrequent, and about the 24th, most of the trees are in full leaf.

The summers, while warm, are not oppressively so, the mean temperature of July being but a shade above 70 degrees, and that of June and August, a few degrees lower. Wholly overcast and rainy days are of rare occurrence, the rain falling in showers and thunderstorms of short duration; indeed, from the middle of June until the end of August, one may expect no day without a few sunny hours. The autumn sets in very gradually, and while frost may occur as early as September 20th, it is usually well on in October before there is anything severe, and towards the end of November before the mean daily temperature falls to the freezing point. The

mean daily temperature of the coldest month is 23 degrees in the Niagara peninsula; 21 at Toronto; 15 at Peterboro. The following are the lowest temperatures on record:—Toronto, 26 below zero; London, 25 below, and Peterboro, 38 below. The precipitation throughout this part of Ontario ranges between 33 inches, near Lakes Erie and Ontario, to about 40 inches east of Lake Huron, on the western slopes of the highlands where the winter snowfall is particularly heavy.

That part of Ontario which lies adjacent to, but to the northward of the Great Lakes, including the districts of Muskoka, Nipissing, Algoma, and Thunder Bay, possesses a climate quite different from the peninsula, the winters being much colder, owing to the fact that the prevailing north-west winds are wholly overland from the cold continental interior, and the summers are cooler, owing to the fact that the prevailing south-west wind is from the cold waters of Superior and Huron. The July average temperatures at certain points are:—Gravenhurst, 67; Parry Sound, 67; Sault Ste. Marie, 62; Port Arthur, 62; and the January averages are, respectively, 15 degrees, 15 degrees, 15 degrees, and 7 degrees. Temperatures of 30 and 40, and even 50, below zero are occasionally recorded in these districts.

In all these districts the ground is usually snow-covered from the end of November until the end of March, or even a little later. The trees are from one to three weeks more backward in the spring, and shed their leaves in autumn earlier than near Lakes Erie and Ontario. The total annual precipitation in Muskoka, Parry Sound, and Nipissing, is quite comparable with the amount further south, but to the westward it falls off to about 24 inches.

THE ST. LAWRENCE VALLEY, which includes the extreme eastern portion of Ontario and Quebec, eastward to the Gaspé peninsula and northward to the Laurentian Mountains, has a much milder climate in the west than in the east. In the west, from Kingston to about Lake St. Peter, the summer climate is quite comparable with that of the peninsula of Ontario, both temperature and rainfall being very much the same. After September, however, the temperature takes a more rapid downward trend. The first autumn frost occurs

earlier, and the ground is usually snow-covered when there has been no snow in Toronto and western towns. The mid-winter mean temperature at Montreal, Ottawa, and Sherbrooke is from 8 degrees to 10 degrees lower than at Toronto and London, but as the spring comes on the difference becomes less, and by early May the season is as far advanced in Montreal as in Toronto.

From Lake St. Peter to Gaspé, the mean temperature is progressively lower from west to east, but the whole region is favoured by a glorious summer, which continues into September; usually, however, before the close of this month the red and yellow foliage is indicative of the near approach of autumn storms, to be followed by the long Lower Canadian winter. The whole lower St. Lawrence valley, and the shores of the gulf, is a region of heavy snowfall, and several feet of snow on the level is not uncommon during the winter months.

THE MARITIME PROVINCES have a climate which is in many respects comparable with that of southern Ontario, but there are important differences. The spring opens somewhat later near the sea, and in a latitude somewhat higher, and then, again, the summers, while a little warmer than in the south of England, are rather cooler than in the peninsula of Ontario. Temperatures exceeding 85 degrees, and at times, 95 degrees, are by no means infrequent during the summer months. After September, the temperature declines quite rapidly, and while October is a month of much fine weather, night-frosts are liable to be severe, and towards the close of November the normal daily temperature falls below the freezing point.

The winters in Nova Scotia are not quite as cold as in southern Ontario, but over the greater part of New Brunswick they are colder, and taking Fredericton as a good example of prevailing winter conditions, we find them closely comparable with those of western Quebec, where zero temperatures occur quite frequently between mid-December and the first of March. The precipitation, which is ample throughout the provinces, is heaviest along the south shore of Nova Scotia where it exceeds 50 inches, while between 40 and 45 is more general. The snowfall is very heavy in northern New Brunswick, where it exceeds 100 inches, and diminishes

southward towards Nova Scotia, where the precipitation accompanying winter storms is usually partly in the form of rain.

NORTHERN TERRITORIES. With the exception of the Maritime Provinces, the various Canadian provinces extend away to the northward, towards latitudes where the climate is either sub-arctic or approaches it. Quebec includes a large territory north of the St. Lawrence and Ottawa, and south of a line between Moose Factory and Lake St. John, much of which will certainly prove of high agricultural worth. North of this, again, is a vast country lying between Labrador and Hudson Bay, the southern part of which contains most valuable forest areas and unknown mineral resources, but it is doubtful whether any portion of it can be utilized for agricultural purposes. Ontario, likewise, includes within her boundaries, a large territory of agricultural worth lying west of Quebec, and northward from the Canadian Pacific to the Albany River, of which the climate has not as yet been thoroughly studied, but it certainly must compare very closely with that of the Province of Quebec. The district of Patricia, the country north of the Albany, is of much more doubtful value from an agricultural standpoint, the summers being short and cool, and the winters long and cold.

It is probable that the northern third part of Manitoba, and also north-eastern Saskatchewan, will never prove of much value for agriculture, as the climate is very similar to that of Patricia. This opinion is, however, only tentative, pending the establishment of interior climatological stations, which may show that general inland conditions differ widely from those at the coast, as represented by Nelson and Churchill.

The summer isotherms in Alberta run nearly north and south, hence the extreme northern part of the province from June to the end of August, is, climatically, quite comparable with the south.

Yukon Territory, and the valley of the Mackenzie River, have too short a summer and too cold a winter to be very valuable from an agricultural standpoint, but even in these far north lands, vegetables and fodder may be profitably grown, and will prove a most valuable asset to communities engaged in mining and other industries.

BANKS AND BANKING

BY GEORGE BURN *

So much has been written from time to time on the subject of banking, that the topic has, I fear, become worn threadbare. The business, now largely monopolized by incorporated companies, was commenced by private individuals, the "money changers", of whom we read in Holy Writ, belonging to this class. It is evident that the custom of paying interest, or "usury", was not uncommon, although the latter word had a different meaning, when the translation was made, from what it has now.

The private bankers of those days occupied wooden benches in public places, with tables before them, hence the name "banker", from banco—a bench.

We have the first authentic record of the establishment of a bank in 1157 A.D., when the Bank of Venice was founded. It lived for six hundred years.

For at least two hundred years following the establishment of the Bank of Venice, the art of investing money was practically unknown. Bullion was converted into coin, more or less as it is now—and straightway seemed to vanish. As soon as it was put into circulation it went into the long stocking; it was tied up in bags, in boxes, in old boots, in every sort and kind of receptacle, in fact, that its owners' ingenuity could devise, as looking least like a "money-box"; and forthwith it was just hoarded.

Old wills, and other documents, frequently recorded the hiding-places of such savings under floors and hearthstones,

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in corners of old presses, in niches hollowed out of walls, and numerous more or less ingenious "safe deposits" as were considered unlikely to be discovered without the aid of the owners' directions.

From the habit of hoarding coin, probably grew the early stages of investment, when it became the fashion among a certain class to exchange their money for gold and silver plate, which encouraged, or developed, a class of merchants working and dealing in precious metals—goldsmiths and silversmiths.

These goldsmiths were, generally speaking, responsible and respected worthies. Many of them became wealthy. Their shops were treated by their customers as "safe deposits"—safe places to deposit their valuables.

In the latter part of the sixteenth century, the goldsmiths began to pay interest on money deposited with them, and to re-use those deposits to advantage in their business. This was beneficial to both merchant and depositor, and as the practice developed, it brought about the establishment of the private banks.

At the end of the seventeenth century—in 1694, to be exact—"the Old Lady of Threadneedle Street", the Bank of England, was established, the Act of Parliament to incorporate it being passed on April 25th of that year. Its founder and first governor was William Paterson. The following year saw the foundation of the Bank of Scotland.

While it is contended that the Canadian banking system was modelled on that of a United States bank, which commenced business in 1791—and this may be true of the original charters of the Bank of Montreal and the Quebec Bank—the fact, nevertheless, remains, that development has been almost entirely on the lines adopted by the Scottish system, altered, it is true, to meet the exigencies of a new country. Shortly after Confederation the necessity for a banking law, applicable to the united provinces, became manifest, and the foundation of the present Act was laid in 1870 by the passing of a statute by the Dominion Parliament. The Bank Act has been revised again and again, usually in the direction of furnishing greater safeguards, first, to the public who may be termed involuntary creditors of the banks by being holders

of their promises to pay, which are ordinarily termed bank notes, and second, to those of the public who, by depositing money in the banks, have become voluntary creditors for the time being.

The care which now surrounds the bank-note holder is a striking example of the evolution brought about by years of study. Forty years ago, if a bank failed it was by no means certain that its notes, or bills, would be paid in full, and it was a common practice for brokers to go about and buy, at a discount, the notes of any recently-failed bank, selling them again to persons having liabilities to the same bank, in payment for which the latter was compelled to accept its own obligations.

In 1880 the bank-note issues were made a first charge on the assets of the bank issuing them.

When the assets of the bank were all realized on, and disbursed to the creditors, any bank-notes outstanding were worthless.

In the revision of the Bank Act, in 1890, the following improvements were adopted:—The establishment of a fund in the hands of the Dominion Government whereby the notes of any solvent bank existing in 1890, or established since, are good for all time until redeemed. Not only is the note circulation a first charge on the assets, thus having \$11 to \$13 behind every \$1 of circulation, but should there not be enough realized from the securities of any insolvent bank, the Government can intervene, pay all outstanding circulation, and call on the other banks to make up the shortage.

The privilege of circulation is the only one enjoyed exclusively by the banks. In common with loan companies, and the public generally, they have the privilege of accepting deposits, and of loaning money, but the latter is restricted by certain wise rules, based on the experiences of the past.

The statute of 1913 added a number of important measures to the banking laws of the Dominion, not the least important being the arrangements made for the issue of excess circulation, over and above the unimpaired paid-up capital of each bank, by the deposit of gold, or Dominion notes, in a trust company in Montreal, controlled by four trustees, who represent the Minister of Finance and the banks. So far this

arrangement has worked well. It was adapted from the Scots law of 1847, with the exception that the Scottish banks are allowed to hold the gold in their own coffers, instead of depositing it in an independent central reserve. The circulation privileges thus extended are three in number:

1st. To the extent of the unimpaired paid-up capital.

2nd. From September to February, excess circulation to the amount of fifteen per cent. of the combined capital and rest of each bank, for which the banks using it pay interest at the rate of five per cent. per annum.

3rd. The central gold reserve deposits above-mentioned.

Another important feature of the Act of 1913 is the adoption of what is known as the external, or independent, audit. This gives the shareholders a voice in the selection of auditors, and the Minister of Finance has also the power to call for an audit of a special character, if, for any cause, he has reason to think occasion requires it. The audit clauses call for two examinations in each year, and the auditors' certificate must be read at the annual meeting of the shareholders. The auditors have a right to call for all books, papers, returns, etc., of the head office, or any branch.

While the adoption of this external audit may not prevent bank failures—it has not, in Great Britain, prevented a number of financial disasters—it will undoubtedly have a most wholesome disciplining effect, and will additionally safeguard the interests of the public. The banks were authorized, in 1913, to lend money to farmers on the security of grain grown on their farms.

That the branch system has helped the development of the country cannot be denied. It is a well-known fact that Canada has more branch banks to the 1,000 population than any country, excepting, perhaps, Scotland.

The advantages of having a branch of a large bank in a small town far outweigh any professed disadvantages. The branch system, as has often been pointed out, automatically facilitates the flow of capital from the points where there is more money than there are uses for it, or, to put it in another way, enterprise to use it, to those places where it is in demand and can be loaned. The branch system equalizes rates of discount and interest, so that the rates charged for loans in

Canada do not vary so much between east and west as they do among our neighbours to the south of us.

All classes of the community are served by the banks, which, as already stated, have extended their offices into all parts of the inhabited country, from the Atlantic to the Pacific. Through these branches, the banks come into touch with the smallest farmers, with the humblest shopkeepers, and with manufacturers of all grades. They advance on farmers' promissory notes to the retail merchants in the small villages, and to the large implement manufacturers on the same class of paper. They help the lumberman—through advances on the collateral of logs—to employ thousands of men in the winter months to manufacture additional logs for the sawmill to cut next summer. These advances are usually not retired until the following December.

They finance the grain growers and the grain buyers, in many cases carrying the elevator receipts for grain, against which they have advanced, from the close of navigation until the following May. They are dependent on the public for their business, and without the support of the public could not live. As middlemen, they fill an important function in the financing of the country. They have been accused of being a great combination, or trust. To anyone who knows the amount of competition for business which exists among them this charge seems very absurd. They maintain branches, often for years, before they become paying offices, and in the past many small places have been "over-banked" by the spirit of competition and rivalry which has arisen.

The banks are ready to help, in any safe way, the incoming settler, including taking care of his cash and assisting him with the best advice possible while he prospects. They have played an important part in aiding the settlement of the far West, and also in helping municipalities and governments in the placing of loans—not the least of which was the part they took in the first Canadian war loan, subscribing for half of the original amount of \$50,000,000, and thus helping greatly to make the loan the undoubted success it was.

SCIENCE AND THE SOIL

THE INFLUENCE OF CHEMISTRY ON AGRICULTURE

BY FRANK T. SHUTT, M.A., D.Sc., F.I.C., F.C.S., F.R.S.C.*

Agriculture is the basic industry of Canada. As it has been the pioneer occupation in the Dominion, so must it always remain the staple business of our people, influencing and determining by its development and progress the welfare and prosperity of our national life.

Canada is essentially an agricultural, food-producing country; as we are able to place more and more acres of our unoccupied lands under successful tillage, as we are able profitably and without impairment of the fertility of our land to increase crop yields, so shall we, in a very permanent and satisfactory way, add to the nation's wealth, not only as regards agricultural products, but in the support and encouragement of every calling and occupation that makes for the country's good.

Canada's cultivable land is her greatest and most valuable asset. It will be the wealth and life as coming from our farms which will play the most important and vital part, which will contribute most towards the building up and prosperity of this country in its national life. We have in our north-western provinces alone, unmeasured, almost illimitable acres of the most fertile soil awaiting the plough, much of that soil rich and deep, a veritable mine of plant food, chemically and physically perfect and specially adapted, so far as we can judge,

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for the production of the finest quality of the most important of all crops—wheat. With this heritage and an intelligent, industrious, God-fearing people, who can doubt as to Canada's future?

For a quarter of a century and more, scientific investigations have been carried on at the various Government Experimental Farms and Institutions—Dominion and Provincial—with the object of increasing and improving the product of the soil; in other words, of making farming—general and specialized—a more rational and profitable vocation throughout the Dominion. This application of science to Canadian agriculture has borne good fruit.

The Dominion Experimental Farm system has a special division devoted to chemistry, with extensive laboratories at Ottawa. In addition to its work on soils, it includes in its wide field of experiment and research the solution of problems relating to the feeding of live-stock; the production of field crops, cereals, roots, forage plants, and grasses; the growth of fruits and vegetables; the nature and value of manures and artificial fertilizers; the control of injurious insects and plant diseases. In a word, it seeks to give aid to Canadian agriculture wherever chemistry may be of assistance. It is undoubtedly doing a valuable work towards our national advancement.

We rejoice that our Government and people realize, so early in our country's history, that it is largely through scientific research that true progress in farming must come. The still keener realization of this important truth on the part of our intelligent and loyal citizens will assuredly further assist in placing our country's chief industry—agriculture—on a lasting and more profitable basis.

THE INFLUENCE OF ART AND LITERATURE

BY BERNARD K. SANDWELL, B.A.*

The economic and social life of the English-speaking people of Canada has much in common with that of the Americans. Their political institutions, up to the point where autonomy begins to be limited by the sovereignty of the Imperial Parliament, have almost everything in common with those of Great Britain. Their ethnical character is much more purely English, Scottish, and Irish than that of the Americans, because they were subjected much later than the latter to the influences of the vast stream of continental European immigration, and the Canadian national mind is scarcely beginning to feel the various non-British impulses which have been a strong factor in American art and literature for a generation. Yet in their tastes, their ideas, their manner of living, they are governed much more largely by American tastes, manners, and ideas than by those of Great Britain; much more largely than one would expect from their lack of racial and political community with the Americans. A nation of six millions (omitting for a moment the French-speaking portion of the population), has dwelt elbow to elbow, along a frontier of thousands of miles, with a nation of ninety millions, and speaking the same language, from the beginning of its history. In the industrial world it has achieved independence by a policy of carefully adjusted customs duties. In the intellectual world no customs duties have much effect.

The proximity of the United States has influenced the art and literature of Canada, not so much by colouring the methods, as by limiting the output. Canadians have not been as

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conscious as they might have been of the need for self-expression, because they have been abundantly supplied with art and literature expressive of the neighbouring Republic. At the same time Canadians who had the gift of expression, were far too frequently attracted to the United States, where greater wealth and larger population ensured the artist a better reward. Even among the men of high ability who did not actually remove to the United States (or to England, which also exercised its attractive power upon some), the necessity of writing with a view to American or British publication, if they were to secure a large public and a decent financial reward, prevented them from seeking to express purely Canadian concepts for a purely Canadian public, and required them to adapt their work largely to non-Canadian standards of taste. Meanwhile, the Canadian public, long habituated to seeing non-Canadian standards observed even by its own Canadian writers, to having them deal with American subjects or adopt an American point of view, has largely come to the conclusion that there is no national Canadian art and no need for one; that Canadian literature is sufficiently upheld by a body of Canadian-born writers living in New York, or writing in Canada for New York periodicals; and that the country is too young, or too poor, or too busy, to be able to maintain a body of writers and artists devoted to the business of expressing Canada for Canadians.

Much of the most successful work of Canadian writers of the last fifty years is as little expressive of Canada—of the true mind of the Canadian people—as the work of the Irish dramatists of the Victorian era was expressive of the mind of Ireland. Some of the external aspects of Canadian life have been portrayed with skill; the deeper issues have scarcely been touched. Matters upon which the heart of the English-speaking Canadian can be touched to a fire of impassioned feeling, a fire capable of attaining the white heat of tragedy, are not numerous, and do not change much from generation to generation. Even so, our writers pay small attention to them. From the earliest days, the intense conviction of the typical English-speaking Canadian (and here he was at one with his French-speaking brethren) was that his heritage of Canadian soil must be preserved from becoming a part of the great ex-

periment in new governmental methods and new ideals to the south of him. This is the first of the great Canadian passions. Up to 1812, time and again, he maintained that conviction by force of arms. Later, the conflict was transferred to other and more peaceful fields, and became a calm and finally a very friendly struggle; but the conviction still stands, and the Canadian still maintains with dogged pertinacity and not infrequently with much self-sacrifice, his determination that his country shall develop upon its own lines and within its own limits. It is curious, by the way, and significant of the concentration of attention upon political and economic matters, that the vast importance of a characteristic native art and literature to full national development has never been taken to heart, when so much energy has been spent upon safeguarding the Canadianism of political institutions, transportation routes, industries, educational systems, and financial powers.

When the danger of forcible Americanization had been finally disposed of by the War of 1812, there came for a time another struggle. Canadians began to perceive that too much Downing Street might be as fatal to the ideals which they were unconsciously forming for the new nation, as too much Washington; and there ensued that struggle for responsible government, and for a proper distribution of the powers of government among local and central bodies, which was finally ended by the British North America Act. The constitution provided by that Act has worked very satisfactorily indeed, until the present world-convulsion; but if the need for further readjustment should now be felt, there may be a renewal of the clash of contending ideals which (however painful at the time) is so invaluable for the development of a rounded national consciousness.

To these two matters of passionate feeling among Canadians may be added a third, perhaps the deepest and most abiding of all. In the political life of the United States religious controversy has scarcely any part; in the political and social life of Canada it is all-pervasive. The United States was founded, and its constitution drawn up, by men who were all of very similar religious attitude; Canada consists of different races, with widely differing conceptions of the relation

of church and state, church and family, church and individual. The efforts of these different races and different conceptions to advance themselves, the attrition of such different nation-materials, their conflicts and compromises for the development of a united Canada, form the most promising material that any deep-probing novelist could demand for the exercise of his art; but efforts to treat them seriously have been almost nil. As for drama, there exists no machinery for the presentation of Canadian plays to a Canadian public.

In the fine arts, national development has gone a good deal further in painting than in fiction and poetry, although the emigration to the United States and to Europe of good artists in both metiers has been deplorably large. Poetry is less of a business than novel-writing, requires less of a public for its support, and can be carried on by persons engaged for a livelihood in other more productive occupations, such as the Civil Service and various professions. In the case of Robert W. Service, we seem to have evidence that in this decade a Canadian poet, writing primarily for a Canadian public, can even make a profitable living out of verse, providing he possesses a certain knack of capturing the popular ear. In painting, which is supported directly by the munificence of the wealthy classes, there has of late been an evident disposition on the part of patrons to encourage Canadian subjects and methods of treatment, and a corresponding development of self-reliance and self-respect among Canadian artists. The external influences at work upon Canadian painting are much more European than American. This may be accounted for by the fact that, in order to experience the influence of American art, a student must go to the United States, and those Canadians who have done so have, as a rule, remained there and enlisted in the American artistic army.

We thus find that the artistic impulse in Canada has been overshadowed in varying degrees, according to the nature of the field, by the greater, more developed, and more self-conscious nation to the south. That Canadian art is, by degrees, emerging from the shadow, is equally evident. Forces are now commencing to work which must immensely hasten the task of emancipation. The war is affecting Canadian art and literature, for their great and abiding good, in at least two

ways. It has diverted the attention of serious Canadians from the purely economic tasks and problems on which the nation has been concentrated for the last twenty-five years, and has stimulated interest in very much higher things—matters of the mind and soul. On the other hand, it has given Canadians a vastly enhanced consciousness of the value and meaning of their nationhood, not in the realm of dollars and cents, and tons of steel, and bushels of wheat, but as a factor in the eternal world-wide struggle between right and wrong. Alone among the peoples of this hemisphere, Canada has borne her share, in sacrifice of blood and treasure, in the conflict which has racked the world. Alone among the peoples of this hemisphere, Canada has joined hands with the great nations of the East and West in the fight for national liberties and the dethronement of autocracy and tyranny. A nation with this experience behind it will never again consent to accept its artistic ideals, wholesale and unmodified, from another nation—however great and prosperous—which has lifted no hand in the fight. Canada has new national experiences, understandings and aspirations, which will more than ever call for expression in a purely Canadian art and literature. Canada has a place among the nations, a right to a seat in council, which all her wealth and prosperity of the last quarter century could never have given her, but which became hers on the day when her sons stemmed the German rush at Ypres and at St. Julien. If a finer culture and a prouder national consciousness are the first results of Canadian participation in the war, there need be no doubt that a stronger and purer national art and literature will follow closely after.

THE FISHERIES OF CANADA

BY THE HON. JOHN D. HAZEN, LL.D., K.C., M.P.*

Canada has the most extensive fisheries of any country in the world, and it is not too much to say that practically every square mile of her waters abounds in excellent varieties of fish. On the Atlantic seaboard, without having regard to the lesser bays and indentations, there are 5,000 miles of sea-coast, while on the Pacific, owing to the numerous islands and deep fiords,—which form excellent and readily accessible harbours,—there are 7,000 miles, and in the interior there are about 220,000 square miles of fresh waters, which are abundantly stocked with such excellent food fish as whitefish, salmon-trout, pickerel, etc.

On the Atlantic coast the principal fisheries are the lobster, cod, herring, halibut, mackerel, smelt, sardine, hake, cusk, pollock, oyster, and clam. On the Pacific the industry is at present confined largely to the salmon, halibut, herring, and whale fisheries.

Not only are the fishing areas extensive, but they are exceedingly rich in fish life. This will be appreciated when it is pointed out that nearly all the salmon, lobsters, herring and mackerel, all the sardines, oysters, and clams, and much of the cod, hake, and pollock landed in Canada, are taken from its territorial waters. Indeed, there is not a mile around the Atlantic seaboard where cod cannot be taken. Then again, adjacent to the Atlantic coast are such noted fishing banks as Canso, Misane, Banquero, Sable Island, Middle-ground, Lahave, Roseway, the Georges, and several others, in addition to the Grand Banks off Newfoundland, while off the

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Pacific coast are the most wonderful halibut banks in the world.

The salt-water fisheries are divided into two classes, the inshore and deep sea. While there is bound to be a tremendous development in the deep sea fishery, keeping in view the splendid fishing banks that lie off the coasts, there need be no apprehension that it will replace the inshore fishery, as the conditions for carrying on the latter are ideal. At the present time, there are about eight times as many men engaged in it as in the deep sea fishery. Not only do the inshore waters abound in practically all the varieties of fish, but all along the shores of New Brunswick, Nova Scotia, Prince Edward Island, and the Gulf Coast of Quebec, are numerous harbours and bays in close proximity to each other, from which boat fishing can be carried on with ease and little exposure.

The lobster fishery on the Atlantic coast is by far the most important of its kind anywhere, and its permanence is being guarded by the enforcement of adequate regulations. Year by year from 75,000,000 to 100,000,000 lobsters are brought in by the Canadian fishermen. The bulk of these lobsters are canned, owing to the remoteness of a great portion of the coast from the live lobster markets.

One of the most interesting fisheries on the Atlantic coast, is the very extensive sardine fishery of Passamaquoddy Bay and the New Brunswick side of the Bay of Fundy. Into these waters come immense schools of what are called on this continent, sardines; they are really the young of herring. To capture them large weirs of stakes or net, or of both, are built, and these sometimes make catches of many hundreds of barrels in one tide. These little fish are largely used as bait, for lobster traps, in the shore and deep sea fisheries as well, but they are mainly canned.

To the many rivers on the Pacific coast come, during a portion of each year, hordes of salmon from the deep sea, which crowd up to the head waters in obedience to their spawning instincts. It is, no doubt, owing to the fact that salmon can be caught with such ease while on their annual migration, that the several other fisheries,—with the exception of the halibut fishery,—have not been developed.

These salmon provide the raw material for a very large canning industry. The fish are delivered at the canneries fresh and firm from the cold waters, and by the use of labour-saving machinery, they are handled rapidly, and in great numbers. There are five varieties, *viz.*, the Sockeye, the Spring Quinnet or King Salmon, the Coho or Silver Salmon, the Humpback or Pink Salmon, and the Dog Salmon or Chump. Of these the most valuable is the Sockeye. Its flesh is red, and it is rich in oil. As it was practically the only variety canned in Canada for many years, many people have gained the impression that if canned salmon is not red in colour it is not real salmon, but the other four varieties, though not so highly coloured, are excellent, both in quality and flavour. As their general excellence becomes better known, the demand for them will expand accordingly.

As the Grand Trunk Pacific Railway, which has its western terminus at Prince Rupert, at the very door to the fishing grounds, is now in operation, there will, no doubt, be a speedy development of the several fisheries of the Pacific coast.

Until quite recent years, the fishing industry progressed very slowly, with a few notable exceptions, and this is not surprising in a country like Canada. The distances in this country are great. The population is yet small, and comparatively scattered. The land is fertile, and farm products, including land animal meats, have until recently been plentiful, readily available, and cheap. Meat, moreover, is more easily handled than fish. Fresh fish—in which condition it should be used wherever possible—is highly perishable, and so needs chilled and rapid transportation facilities and careful handling. These conditions have all militated against the general use of fish.

The days of non-progression have, however, passed. The country is rapidly realizing the great asset it has in its fisheries. Everywhere the stimulus of a rejuvenated energy in the conduct of the industry is evident. That this is in an important measure due to assistance given by the government, there can be no doubt. A few years ago the government undertook to aid the development of the industry by placing at the disposal of the shippers refrigerator cars, and it also undertook responsibility for the payment of one-third

of the ordinary express charges on less than carload lot shipments. It has also assisted the industry in various other ways. The recent increase in the cost of land products is also lending itself to the expansion of the demand for fish. Indeed, it is evident that the day is rapidly approaching when fish will form an important item of the people's food.

As an index of the progress amongst the fishermen themselves, it may be pointed out that it is only a few years since the first motor was installed in a fisherman's boat. Now there are about 10,000 such boats using motor power.

Up to the present, the enormous schools of herring—second to none in quality—that frequent our coasts, have been taken only when they come inshore at the spawning time, and when they are in poor condition. Attention is now being given to the possibility of capturing these fish in deep water, as is done on the European side, and packing them in the most approved manner. To this end a Fish Inspection Act, modelled on that of Scotland, has been adopted. The Act came into operation on the 1st May, 1915. Fish properly packed will in future be branded with the government brand, which will assure it a standing in the markets of the world.

Development of the oyster, and hard and soft-shell clam fisheries has been delayed, owing to the question of jurisdiction over these fisheries being in doubt. This matter has now been settled, and the different provinces are now in a position to grant leases for the culture and cultivation of oysters. The excellence of the Canadian oyster is well known. The gold medal has been awarded for our oysters at every exhibition in the world, at which they have been shown.

Everything points to an exceedingly bright future for Canada's fisheries. As before indicated, off both coasts lie fishing grounds unsurpassed in richness, which, owing to their geographical location, can be more readily and more cheaply exploited from Canadian bases than from anywhere else. The inshore fishing grounds abound in fish, and these grounds can be fished, with little risk or exposure, from the numerous harbours or bays which dot the coast-line. In addition to the world-wide markets which are ever demanding more and more fish, Canada's rapidly-increasing population will afford a steadily expanding home market.

THE IMPERIAL HOME RE-UNION MOVEMENT

BY FRANK WISE, F.R.C.I.*

The Imperial Home Re-Union Associations of Canada consist, all told, of some thirty-five branches, each acting quite independently and individually as to management and finances.

Inaugurated generally in the years 1911-1912, the purpose of these associations was to grant aid in the form of loans to those heads of families of British birth who had settled in Canadian cities, but had found it impossible, while paying their own living expenses and sending assistance to their families at home, to save enough wherewith to defray the cost of transporting their wives and children to Canada.

The movement was started in Winnipeg, by W. J. Bulman, a well-known manufacturer of that city, and quickly spread all over the Dominion. In each of the thirty-five cities where the branches are located, is a Board of Guarantors—business and professional men—each member of which is personally responsible, up to a certain limit, to the association's bankers in their particular city, the Board as a whole maintaining a substantial guarantee fund. In Toronto, for example, this fund amounts to \$50,000.

There is also in each city an honorary governing committee of local business men, who examine applicants, and, in approved cases draw on the bank for the amount required to furnish the necessary tickets, etc., which are arranged to be delivered by the steamship company's agent to the applicant's wife in Great Britain. On his part, the husband is required to advance in cash at least twenty per cent. of the amount of

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the fares, and to sign a regular business note for the balance, repayable in stipulated amounts at regular intervals, and bearing current bank interest.

Taking the Toronto branch as an example, we find that in three years almost \$90,000 was expended for transportation, and some three hundred heads of families were assisted in bringing over 2,150 mothers and children. At the end of three years—eighteen months of which have been the worst ever experienced in Canada—practically all these debts have been duly paid. In all, by the several branches, many thousands have in this manner been settled in Canada during those three years.

Many surprising and gratifying features have presented themselves. The men, having been treated, not as mendicants, but practically as business men asking a bank for a loan, have looked upon the transaction as a debt of business honour and have made arrangements to meet their instalments in a most creditable manner. There were a few exceptions, of course, but a firm hand on the part of the Board soon convinced these delinquents that, as business men, they must meet their business liabilities, with the agreeable result just cited.

Apart from the benefit to the employer in having a contented workman in the place of one whose thoughts are ever with his wife and children on the other side of the water, two distinct advantages accrue to these families generally: the first, that young children of good stock are brought to the newer country at an age when they easily assimilate the new atmosphere and grow up to become good citizens; the second, that an opportunity is put into the hands of the parents which means everything for the future of their children—excellent educational facilities free of all cost, the health-giving advantages of a bracing climate, with bright, dry, and cold winters, and the encouraging and vivifying sun of the summers, and, perhaps, best of all, opportunity of employment at good wages on reaching the proper age.

The various branches of the association confine their efforts entirely to men working in the cities, it having been found impracticable to put the organizations into sufficiently close touch with farmers to aid those men who were working on the land. The associations have memorialized the Dominion and

Provincial governments, citing the success achieved in the cities, and, urging them to apply a similar plan in connection with those men who cannot take advantage of the present organization.

The work, except in the matter of collections, necessarily has had to remain in abeyance during the war, and will remain so until it is deemed advisable to recommence operations. This will undoubtedly be done as soon as conditions warrant, and it is discovered how well and how soon Canada will be able to absorb her present industrial population, including those who will return when mustered out of the armies.

Those responsible for the Imperial Home Re-Union Movement have derived considerable pleasure through being able to render aid to large numbers who have proved to be such admirable immigrants; that these immigrants, in their turn, have appreciated the helping hand extended to them to enable them to improve their domestic—and in many cases worldly—welfare, is proved by the many expressions of grateful thanks the associations have received.

Every happy and comfortably-placed workman is an asset to the country in which he lives. The greater the number, therefore, that the Dominion can—and eventually will—maintain, the better it will be for the people themselves, for Canada, and for the Empire.

CANADA'S BLACK DIAMONDS

THE DOMINION'S COAL-FIELDS

BY ALEX. DICK *

The national importance of the Nova Scotia coal-fields, considered as one of the valuable assets of the British Empire and as a source of supply for the navy, has been considerably emphasized during the past two years, and is likely, in future, to receive even greater attention. Great Britain, with her collieries situated at tidewater, and in many cases winning coal under the sea, possesses the largest and most valuable coal resources of Europe, which enables her to control practically the European coal market, and to carry on manufacturing for an enormous foreign trade. The coal-fields of the United Kingdom have been the greatest factor in building up and maintaining British trade supremacy. It is a remarkable fact that in the coal-fields of Cape Breton, the British Empire possesses the only coal deposit at tidewater on the Atlantic seaboard of North and South America. It is also a remarkable coincidence that this is true of the Pacific seaboard, where the valuable coal deposits of Vancouver Island belong to the British Empire. All the coal deposits of the United States are from 200 to 400 miles distant from the seaboard. There are small deposits of coal in California and Chili, but these coals are of inferior quality, and cannot compete with the bituminous coals of British Columbia. It will be seen, therefore, that the possession of these valuable coal deposits at tidewater is of far-reaching and vital importance to Canada and to the Empire.

At the meeting of the International Geological Congress

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held in Toronto, in 1913, a monograph on the coal resources of the world, which had been carefully prepared by leading geologists, was the chief topic of discussion. Professor Dowling, of the Canadian Geological Survey, was selected to compute the coal resources of Canada. He estimated the available coal in fields already discovered at 1,234,269,310,000 metric tons. These vast coal resources are distributed between the Atlantic and Pacific oceans, as follows:—

Nova Scotia	9,718,968,000 metric tons		
New Brunswick	151,000,000	"	"
Ontario	25,000,000	"	"
Manitoba	160,000,000	"	"
Saskatchewan	59,812,000,000	"	"
Alberta	1,072,627,400,000	"	"
British Columbia	76,034,942,000	"	"
Yukon	4,940,000,000	"	"
North-West Territories	4,800,000,000	"	"
Arctic Islands	6,000,000,000	"	"

Thus far, no coal-field of commercial value has been discovered, or developed, in the great central provinces of Quebec and Ontario. The Province of Quebec is dependent largely on Nova Scotia for its coal supplies, and the Ontario manufacturers and consumers are practically dependent for their supplies on American coal from the coal-fields of Ohio and Pennsylvania.

EASTERN COAL-FIELDS. Collieries have been developed and maintained in continuous operation in Nova Scotia since 1851. For many years the growth of the industry was comparatively slow, and up to 1866 the chief market was found in the United States. In the year in which the Civil War closed, the United States imposed a duty of \$1.25 per ton on coal. This shut out Nova Scotia coal, with the result that for fifteen years thereafter the industry was in a very precarious condition. With the adoption of the national policy in Canada in 1878, when a duty of sixty cents per ton was imposed on American coal, there was a revival in coal-mining, and for the first time in its history, Nova Scotia coal found its way into the principal markets in the Province of Quebec. Coal-mining began to attract the attention of capitalists, and in 1892, a number of the small companies operating in Cape Breton county were amalgamated, and a company was formed

with ample capital for the purpose of developing these extensive fields. Beginning with an output of about 750,000 tons in 1893, the production of a group of collieries controlled by one company has since increased to 4,700,000 tons in a single year. There has also been a considerable increase in the production of other companies operating in Nova Scotia, with the result that the annual output is now around 6,500,000 tons.

Production in recent years has grown at the rate of about ten per cent. per annum. Expansion of the iron and steel industry in Nova Scotia, has created a demand for about 1,300,000 tons yearly. Next in importance to the home market, the largest consumers of coal are the great railway systems extending from Montreal to Halifax. With the completion of two additional transcontinental systems, it is expected that within the next five years the output of all the companies now operating will be taxed to its utmost capacity to supply fuel necessary for transportation purposes.

Within the past ten years, owing to scarcity of coal in foreign countries, caused by unexpected interruptions and labour disturbances, Canadian coal has been introduced more widely into the markets of the world. It is not improbable that, after the close of the war, this coal may hereafter be even more widely distributed, particularly from the coal-fields situated on the Atlantic seaboard, where submarine mining is now being carried on very extensively.

THE UNIQUE GEOLOGICAL SITUATION OF SYDNEY AND LOUISBURG, CAPE BRETON. The harbours of Sydney and Louisburg are the front doors of Canada. They might almost be called magic doors, opening as they do so wonderfully into short passages to the leading markets of the world. It is an extraordinary fact that these harbours, while more than 2,200 miles nearer to Liverpool than are New Orleans, or Mobile, are at the same time about 600 miles nearer to Perambuco, Rio Janeiro, and Buenos Aires, and about 900 miles nearer to Cape Town, South Africa. This is because ham-shaped South America lies far to the east of North America, while New Orleans, Mobile, and other ports on the Gulf of Mexico are a long distance west of the Atlantic ocean. Moreover, ships from southern ports of the United States cannot take a

direct route, because they have to steer clear of the West India Islands. Cape Breton, jutting far eastward into the Atlantic, is much nearer to a direct line drawn from the east coast of South America. The ports of the Gulf of Mexico are not the only ones over which those of Cape Breton have the advantage.

The most eastern point of South America is Pernambuco. All vessels going south of that point to Rio Janeiro, Buenos Aires, or other South American ports, must pass it. The following tables of distances, in nautical miles, will show the wonderful advantage that Sydney has over all American ports for trading with Great Britain and other countries of Europe, South America, Africa, and Asia:—

To Liverpool		
Sydney Harbour to	Liverpool	2,282 miles
Newport News “	“	3,157 “
Baltimore “	“	3,324 “
Philadelphia “	“	3,160 “
To Pernambuco		
Sydney Harbour to	Pernambuco	3,567 miles
Newport News “	“	3,591 “
Baltimore “	“	3,758 “
Philadelphia “	“	3,746 “
To Cape Town		
Sydney Harbour to	Cape Town	6,467 miles
Newport News “	“	6,736 “
Baltimore “	“	6,903 “
Philadelphia “	“	6,870 “

In considering Sydney's advantages as a coal-exporting centre, in comparison with other localities in America, it must be remembered that the coal mines of the United States are not near the sea-coast, and to reach any of the ports in the above table of distances, their product must be carried hundreds of miles by rail. The only mines in the United States, from which extensive exports of coal have been made, are those of Pennsylvania and West Virginia, and the nearest of these mines is 220 miles from an ocean port.

WESTERN COAL-FIELDS. The total consumption of bituminous coal in Canada amounts to about 24,500,000 tons a year. The consumption of anthracite coal, all of which is imported from the United States, is about 4,300,000 tons yearly. Of the twenty-four and a half million tons of bituminous coal con-

sumed in Canada, about 15,000,000 tons is produced in this country, and the balance, of about nine millions, is imported, chiefly from the United States. In 1900 we produced only 5,000,000 tons, which increased, in 1905, to about 8,000,000, and in 1910 to 13,000,000. While the increase in Nova Scotia, in fifteen years, was comparatively small, the coal-fields of British Columbia and Alberta were rapidly developed, and the combined production of these two provinces is now between six millions and a half and seven million tons a year. Coal-mining operations are carried on extensively in the Province of Alberta. The Crow's Nest coal-field, in southern Alberta, supplies its coal largely to railroads, and to the smelters in southern British Columbia. The collieries on Vancouver Island are situated on the seaboard and so possess the advantage of loading almost directly into steamers. With cheap transportation by water, they are enabled to ship their coal into the San Francisco market.

Both in the Atlantic and Pacific provinces it is not improbable that coal production may be retarded for a time by the development of Mexican oil-fields, and the substitution of oil for coal on ocean steamers. Many of the larger steamers are now being equipped for the use of oil in place of coal, and the railways in the United States and Canada, have, in some instances, adopted oil as their motive power.

There has also been a development of the great water-powers in the Provinces of Quebec and Ontario, whereby the lighting and street railway operations in such cities as Montreal and Toronto are supplied with electric power. To overcome the lack of coal, there is likely to be further development in this direction in both provinces. Manufacturers will also benefit by the extension and cheapening of hydro-electric power.

Apart, however, from a probable increase in the use of both oil and electricity, the future growth of the coal industry of Canada is fully assured. Its future depends wholly on increased population, the continual development of the railway systems, the iron and steel industries, and the manufactures of the country.

NOVA SCOTIA: PRESENT AND FUTURE

BY THE HON. G. H. MURRAY, K.C., LL.D., M.P.P.*

Three principal factors enter into any attempt to forecast the future of a country: the character of its people, the extent and variety of its resources, and its commercial situation.

In analyzing these elements of success with reference to Nova Scotia, we find, first, that the present population is composed almost entirely of sturdy British stock. A considerable number of New Englanders came to Nova Scotia after the taking of Louisburg, and the expulsion of the Acadians. These were afterwards followed by a large number of United Empire Loyalists. The Loyalists settled principally in the western and southern portions of the province, while the purely Scottish element of the population chose the more rugged eastern portion. There the original mountain Celts found counterparts of their own wild glens and wind-swept heights, and made themselves at home amidst congenial surroundings. The highland portion of the people have, of course, outlived the rude usages of their fathers, but they, fortunately, retain all the piquancy of a picturesque race, whose presence in our province has proved to be one of the greatest aids to its settlement and progress.

The people, then, for the most part, are a mingling of English, Scots, and Scots-Irish. They have been described as being under the spirit of the Mother Country to a greater extent than other Canadians. No other province in the Dominion has produced so large a number of prominent men.

*George Henry Murray: born 1861; called to the bar, 1883; appointed to Legislative Council of Nova Scotia, 1889; member of the Fielding Administration, 1891; Q.C., 1895; became Premier of Nova Scotia, 1896; LL.D., 1905. Sir Wilfrid Laurier said of him, "A national figure and the pride of the Liberal party. One and all recognize in him a pattern of quiet and patient courage, of wise and broad tolerance, and far-seeing statesmanship."

Nova Scotia, in Howe and Johnstone and Tupper, produced three of the greatest figures in Canadian history. She has given Canada three Prime Ministers out of eight, while no fewer than eight university presidents of Canada and the United States are natives of the province. Since the outbreak of the war, 20,000 young men have volunteered for service overseas, and some rural districts are stripped bare of men of fighting age. This is only what might be expected of the descendants of a fearless people, living in a country with a climate neither so cold as to be inhospitable, nor so warm as to be enervating.

Within the past seven years the spreading abroad of information respecting the natural advantages of the province has resulted in the coming of 28,000 settlers. Nineteen thousand of these were of British, 7,000 of foreign birth. The latter have been employed in our coal mines and steel works. Eighty-eight Hollanders have settled on farms in the province within the past two years. These settlers have already proved themselves to be excellent citizens, and give promise of being of most valuable assistance in the development of the dairy-industry. Nova Scotia will henceforth look to the Netherlands for immigrants, as well as to British sources.

"The tools", said Carlyle, "to the man who can handle them". The soil, the forests, the fisheries, the minerals, the water-powers, are the great quarries of Nova Scotia, out of which men who can handle the tools will hew greatness and prosperity.

Every country has its own peculiar agricultural problems, and before one can pronounce judgment upon the degree of progress made, or forecast the probable course of events in that industry, one must understand the circumstances in which the farmers have been working. So diversified are the interests of Nova Scotia that the agricultural industry does not, at first sight, appear to be so prominent an asset as in a less richly endowed country. Every kind of soil is present, from the immensely rich intervalles and dyked meadows to high uplands and wide pastures. At the same time, there are only 50,000 occupiers of farms, who take up but 38 per cent. of a total of 13,483,671 acres. Of the remaining area about 50 per cent. can be cultivated or grazed. This

lack of agricultural population may be traced to two causes: the rush for the free wheat lands of the West, and the attractive wages offered in various accessible industrial centres. The proximity of many large American cities was long irresistible, but work in these immense urban communities is now proving less lucrative. There is a tendency on the part of immigrants to Canada to seek more detailed information respecting the older settled provinces. Sons of the province, as well as newcomers, have begun to realize the ideal conditions for mixed farming which Nova Scotia possesses.

The outstanding agricultural features are the dyked marshes, the intervale lands, the fruit lands, and the uplands. The dyked marshes are large tracts of extremely fertile dyked meadows that have been reclaimed from the sea. This land lines the head-waters of the Bay of Fundy, and spreads inland up its river tributaries. It yields from two to three tons of hay per acre, besides affording fall pasture for large herds of cattle. Beef cattle are raised on these dyked lands, and on some of the more isolated river valleys. In these sections there is a strong demand for those strains of the beef breeds that are good milkers, as such animals help with their extra yield of milk to make beef-raising profitable. The intervale land is an equal source of profit to the farmer.

The principal fruit region covers the valleys of the Annapolis, Gaspereau, and other rivers around Minas Basin, although there are large tracts in other portions of the province capable of producing high-class fruit. Here the sunny weather of summer and autumn combine with a suitable soil to bring fruit, and particularly apples, to a state of perfection nowhere excelled. Owing largely to a system of co-operation among the growers, the fruit industry is more highly developed than any other phase of agriculture. Experts who have examined the fruit-growing possibilities of Canada from coast to coast have declared that apple-growing in Nova Scotia offers one of the safest investments in the world to-day. The apple export trade of the province has been built up within the past thirty years, and has grown in that time from twenty thousand barrels to nearly a million barrels. Notwithstanding this phenomenal increase, not one-tenth of the area available for fruit culture has been set out to trees.

The uplands are especially adapted to the growth of hay, roots, potatoes, oats and other grains. The more broken districts make excellent pasturage for sheep-raising, which is a subsidiary industry of great possibilities and splendid potential profits.

It is generally agreed that conditions in Nova Scotia are particularly suitable for dairy cattle, a class of stock in this province which, under proper management, yields a handsome return. The demand for dairy products is out of all proportion to the supply. Farmers who follow the best-known methods of breeding and feeding dairy cows are producing milk more cheaply in Nova Scotia than in any other equal area of Canada. This is owing to the facts that the province raises superior root and forage crops, and that pastures are well clothed with sweet and nutritious grasses. Those who provide sufficient succulent feeds, such as turnips and mangolds, for winter use, can produce milk almost as cheaply in winter as in summer, the month of June excepted. In 1912 the production of creamery butter was twenty-seven per cent. greater than in 1911; in 1913 it was fifty per cent. ahead of 1912; in 1914 it was thirty per cent. greater than in 1913, and the past year showed an increase of thirty-four per cent. above the previous year. Since 1910 the production has increased by 360 per cent. Figures like these show one direction of satisfactory progress in no uncertain manner.

Although high profits have been made in specialized farming in Nova Scotia, it is generally conceded that the most dependable living is to be derived from a wise combination of agricultural pursuits. In other words, the province will always be a land of "mixed" farms. There are no large areas for wheat-growing, nor vast tracts for sheep-raising. The crown lands are not recommended for agricultural purposes. The agricultural newcomer is, therefore, advised to purchase one of the many farms that, for various reasons, are to be obtained throughout the country. This advice is made practicable by means of a government measure, whereby a proportion of the necessary funds for the purpose is loaned to such farmers as require it. This measure is known as an "Act for the Encouragement of Settlement on Farm Lands." In the working out of the Act the government has made arrange-

ments with an established loan company to the end that any deserving farmer, or agricultural newcomer, in the province, who has proper security, can obtain money upon the most favourable terms.

When the loan company will agree to advance to a farmer forty per cent. of the appraised value of the property he wishes to purchase or improve, the government will, in approved cases and to experienced farmers, guarantee, if necessary, an advance of an additional forty per cent., making eighty per cent. in all, advanced by the company. The applicant must possess cash to the value of at least twenty per cent. of the appraised, or purchase, value of the farm, and in addition as much as may be requisite for stock, implements, and house furnishings, and for the maintenance of himself and his family until his first crop is garnered. A mortgage on the property is taken by the loan company.

A farmer who wishes to obtain assistance under this Act, after selecting the property he wishes to purchase, applies for a loan through the Department of Industries and Immigration. The property is then inspected and valued by the farm inspector of the department, and also by the land valuer of the loan company. There is in this a double assurance to the settler that he is receiving full value for the capital he invests.

Farms on which loans are granted are inspected from time to time by the inspector of the department, who may issue instructional advice for the guidance of the settler. The mortgagee must farm, cultivate, manure, and manage the farm in a workmanlike manner, following such methods of husbandry as will keep the land in good heart. He must keep in good repair all the buildings, fences, hedges, and walls on the place, and must not allow any noxious weeds to run to seed. He must keep his farm properly stocked, and so far as is practicable the stock must consume all hay, grain, and root crops grown on the farm. In the event of selling any of these products, he must return to the land either barnyard manure or commercial fertilizer of a value equal to two-thirds of the manurial value of the produce sold.

By the system of repayments adopted, the mortgagee pays back in instalments a certain amount of the principal, to-

gether with the interest. This is known as the amortization plan of repayment. It is important to observe that this plan of paying off principal and interest by half-yearly, or yearly, instalments is more favourable to the borrower than a straight interest mortgage. Not only it makes him save, and thereby encourages thrift, but the actual expenditure is considerably less. It may be difficult for a newcomer, during the first years of his incumbency of the farm, to pay much in reduction of principal. This is taken into consideration, and in order to assist the farmer to get well established, the government and the loan company may agree to a suspension of payments for a period not exceeding five years. The amortization plan will then immediately come into operation, and the payments thereafter will continue to reduce the mortgage debt.

Where straight mortgages are obtained, the interest charge is at the present time from seven to eight per cent., and often higher. Moreover, in straight mortgages, the borrower has no sense of security. The mortgage may be called in at the end of any year. On the other hand, the mortgages negotiated through the Department of Industries and Immigration are for a definite term of years agreed upon, the borrower having the privilege of paying off at any time during that period. The company cannot call in the mortgage until the end of the term, provided, of course, the borrower pays his instalments with a reasonable degree of promptness. The interest charged will vary from six to seven per cent., according to the condition of the money market.

Since the inception of the Act, up to September 30th, 1915, forty-seven applicants have been granted loans. Twenty-three of these were natives of the province, and twenty-four were immigrants, varying from those who had recently come to the province to men who had been resident here for periods up to fifteen years. Those farms on which loans were granted totalled 7,949 acres in extent. The loans amounted to \$95,055, with the government guarantee of \$41,435. The security consisted of buildings worth \$74,575, and land worth \$94,110, or a total value of \$168,685.

For many years a leaven of co-operation has been working within the province. Two hundred and twenty-seven agri-

cultural societies are scattered throughout the country, and these have been aided by the government in connection with the purchase of pure-bred bulls and other stock. At the present time, for every dollar subscribed by the members of these societies, the government adds something over eighty cents; in other words, if a farmer, or any group of farmers, has \$100 to invest in a pure-bred bull, this amount is supplemented by \$80, thus enabling them to purchase a better type of sire. There is also a well-organized Farmers' Association, with a membership representative of every part of the province.

I think it may safely be predicted that the future of agriculture in Nova Scotia is bound up with the principle of co-operation. In certain branches a co-operative system has already been adopted. Probably no fruit growers are more thoroughly organized than those of Nova Scotia. Through the forty-two local fruit companies over sixty per cent. of the fruit is packed, and the total pack is afterwards sold by one selling organization. This ensures uniformity of pack and higher ultimate returns to all the members. The central, or selling, organization keeps in touch with the requirements of the market, and places the fruit where it is needed without the unnecessary expense of middlemen. This organization also makes it possible for the grower to get his fertilizers and spraying materials, feed, and flour, at a reduced cost. Co-operative dairying has also taken root in Nova Scotia. Twenty co-operative creameries are now in operation. These are not merely factories in which so much butter is manufactured, but are also centres for live-stock improvement, for scientific cultivation of the soil, and for co-operative effort generally. The whole movement is permeating the province from end to end, and the results already attained point to the day when Nova Scotia shall become the Denmark of America. The leaders in the agricultural industry adopt the dictum of John Stuart Mill, that, "Of all agencies which are at work to elevate those who labour with their hands, in physical condition, in social dignity, and in those moral and intellectual qualities on which both the others are ultimately dependent, there is none so promising as the co-operative movement."

The farmers of Nova Scotia are beginning to appreciate the potentialities of their industry. The work carried out by the provincial Agricultural College is showing excellent results, and all over the province farmers are realizing that to achieve success they must conduct their operations on sound business principles, and according to up-to-date methods. If the opportunities are embraced which mixed farming in this province offers to the sons of the soil, the wealth production of our farming communities may easily be trebled within the next decade.

In mining, the greatest development of the next few years will probably be witnessed in the coal industry. Nova Scotia has the only great bituminous coal-field at tide-water on the eastern coast of America. The coal resembles in appearance and quality that of Northumberland and Durham, in England. It has a calorific power, running to 14,000 B.T.U. The tonnage mined in 1915 was 6,379,463, and 16,326 men were employed.

The Sydney coal-field lies along the eastern shore of Cape Breton Island, and covers an area of 550 square miles. The field, which is indented by capacious ports, contains seven thousand million tons of coal, in seams of more than four feet. The Inverness coal-field extends for fifty miles along the north-western coast of Cape Breton Island, and covers at least 200 square miles. The quantity of coal in workable seams has been estimated at three hundred million tons. The Pictou coal-field covers seventy square miles, and is estimated to contain not less than one billion tons. The Cumberland coal-field covers 305 square miles, and contains seven hundred million tons, in seams from six to four feet in thickness.

By virtue of the geographical position of the province, the operators are able to market a large portion of the production by cheap water-borne transportation. With the development of home industries, and the opening up of new markets, the coal output of Nova Scotia will doubtless grow to immense proportions within the next decade.

The gold-mining industry, after a decline of several years, has resumed a bright outlook. Mining operations are now being conducted on twenty-seven properties. Many instances of lack of success in this industry have been due more to

improper management than to insufficiency of ore. In several cases, capital was expended on extensive surface equipment, previous to a careful investigation as to the nature and extent of the ore. However, the lesson has now been learned, and scientific mine development is now the order of the day. The output of gold, in 1915, was 7,216 ounces.

The fisheries of the province are valued at about eight million dollars yearly. The men engaged in the industry number 29,364, and the capital invested in vessels, sail-boats, petrol boats, canneries, and gear exceeds seven and a half millions. The principal fish caught are cod, lobster, mackerel, haddock, and herring, in the order named. Approximately 90 per cent. of the Nova Scotia cured fish is shipped to the West Indies, about five per cent. to Mediterranean ports, and five per cent. is consumed in Canada. The output of Nova Scotia canned lobsters amounts to forty per cent. of the total Canadian production, while fully fifty per cent. of all the fresh and tinned lobsters exported from Canada comes from this province. By the adoption of a scientific system of following the movements of the fish, the introduction of the best methods of curing and packing, and by the establishment of quicker service to the principal markets of the world, this industry would be so revolutionized that the present revenue could within ten years be increased to twenty millions.

The average lumber cut of the province approximates four hundred million feet, while the average total export is three hundred million feet. The principal trees are spruce, fir, hemlock, pine, birch, oak, and maple. Spruce is the most valued wood, hemlock coming next in order of importance. Subject to proper methods of conservation, cutting, and protection being observed, the present annual output can be maintained indefinitely. Practically every stock of timber that can be grown in Nova Scotia may be marketed without difficulty, for lakes and streams suitable for floating the logs abound everywhere. Once at an ocean port, the lumber can be shipped at any time of the year, for the harbours of southern and western Nova Scotia are always open. At present the yearly production is valued at four million dollars. With the constant rise in the price of lumber, and the immense gain that will accrue when these lumber and pulp products

are converted into manufactured articles, the forests of Nova Scotia should before long yield four or five times their present revenue.

Sufficient data is not yet available to warrant a detailed account or estimate of the amount of the available water-power throughout the province. It may, however, be stated generally that there is ample for all present and future needs. The work is now in progress under a competent engineer. Possible sites for hydraulic power are well distributed, and the handicap of comparatively small drainage area is largely overcome by heavy rainfall and excellent storage facilities. It is probable that in the future hydro-electrical energy will play an ever-increasing part in the reduction of the Nova Scotia iron-ores, and in the manufacture of steel. A number of smaller sites are so situated as to be of great service in connection with gold-mining.

New Scotland will become a great manufacturing country, as New England has long been. Manufacturing has made considerable progress in recent years. The output of the factories include such a wide range as iron and steel products, textiles, clothing, food products, chemicals, clay, glass and stone products, tobacco, carriages, boats, liquors and beverages, fertilizers, and furniture. With its rich stores of coal and iron—the basic materials of industrial greatness—and the advantage of an excellent geographical position, this province should not only supply its home consumption, but also reach out for the trade of other portions of the Dominion, and of foreign countries. Within this generation Nova Scotia should have not one Sydney, one Amherst, and one New Glasgow, but a score of similar industrial hives.

Nature has dowered Nova Scotia with transportation facilities unsurpassed in Canada. In addition to being covered with a network of railways, no part of the province is far from the sea, and no body of land in the world is more intersected by rivers and dotted with harbours. Thus supplies may be moved cheaply from one point to another within the province, and to and from all other maritime countries.

If a man cannot live by bread alone, neither can a country thrive solely on material prosperity. "Without the vision the people perish." Momentous happenings of the present

day are driving this truth home. The immediate problem confronting the world is the social problem; in other words, the problem of living together. It is in the social relation of men, and of nations, that a lack of understanding is most apparent, and therein is ignorance most damaging. Never has the clarion call been clearer for men of ideas and action, and Nova Scotia is producing men who will answer that call. With her schools and universities and churches and journals—with her public education generally—she will be able, within the coming year, to assist our beloved Canada in clearness of thought, in breadth of vision, and in the promotion of a thoroughly enlightened social and industrial cosmos.

PRINCE EDWARD ISLAND'S FUTURE

BY THE HON. BENJAMIN ROGERS *

This "island", the smallest of the provinces that make up the great Confederation of Canada, is sometimes overlooked by Canadian writers and map-makers. It has its place, however. True, we have no minerals, or large timber areas, but there are other natural resources, which—in the hands of an industrious and frugal people—have made it worthy of the name by which it is generally known, "The Garden of the Gulf."

The soil of the island is fertile, and responds generously to the ordinary cultivation applied to it, in large returns of cereals, vegetables, and grass crops. Our inland waters produce the best oysters in America, and the waters around the coast abound with lobsters and other salt-water fish, suitable to the tables of rich and poor alike.

Fifty years ago our farmers were nearly all tenants of English land proprietors, but now they are independent freeholders, and with them, development and improved methods in agriculture are the order of the day. They supply the industrial centres of the neighbouring provinces with grain, potatoes, and other foodstuffs. Poverty and unemployment—except in rare cases in the towns—is almost unknown here.

The island possesses a healthy and temperate climate, neither too hot in summer, nor very cold in winter. The atmosphere is humid, and there are no protracted droughts such as sometimes occur in the West. Late spring and early autumn frosts, or destructive hurricanes, do not visit us once in fifty years.

Fur-farming is a comparatively new and very successful

* Benjamin Rogers: born 1837; entered Prince Edward Island Leg. Council, 1878; president of the Council, 1891-3; Minister of Agricul. and Prov'l. Sec'y.-Treas., 1900-4; Mem. Royal Conservation Comm., 1909; Lieut.-Governor of P. E. I., 1910-15.

enterprise, the soil and climate being well adapted for the production of high-class fur. Silver black foxes—the most valuable fur-bearing animals in the world—are reared in captivity in large numbers, adding immensely to the wealth of our people. Some \$25,000,000 are invested in this industry.

Our winter communication and transportation facilities with the mainland have hitherto been imperfect and unsatisfactory. We look forward, however, to the establishment of a car ferry across the straits at the narrowest part, namely, between Cape Tormentine in New Brunswick and Carleton Point in Prince Edward Island, in the immediate future. This should put us in quick touch with the outside markets, and will eventually enable us to establish, and carry on manufacturing industries that will attract to our shores a considerable increase of population.

The war has not adversely affected us, commercially, to any extent, except in the matter of our fur and lobster industries, and even in these cases, we believe, the interruption is only temporary.

Possessing, as we do, the natural resources referred to, enjoying the conditions mentioned, and having a frugal and industrious population—who so manfully overcame many apparently unsurmountable difficulties of the early settlement days—we may confidently predict a happy and prosperous “future” for this little province, whose ancient Indian name was “Abegweit” (Cradled on the Wave).

NEW BRUNSWICK: ITS RESOURCES AND ITS FUTURE

BY THE HON J. A. MURRAY, M.P.P.*

The organization of New Brunswick as a province dates from 1784, after the arrival of the Loyalists from the American colonies at the close of the Revolutionary War. Its first Governor was the Hon. Thomas Carleton. It was one of the four provinces to form the Canadian Confederation in 1867. Its people are chiefly of British and French descent. In former days the forefathers of the present generation contended in war for supremacy and control. Now, their children live side by side in peace and contentment, contending in friendly and generous rivalry, uniting to build up a country with a government based on principles of equity and freedom.

A system of free, non-sectarian education has been in operation since 1871. Under this system every child, whether rich or poor, has placed within easy reach opportunities for obtaining a common and high school education, with the way well opened up to university training if it is desired. A prosperous and well-equipped provincial university is established at Fredericton, the seat of government of the province. At Sackville, Memramcook, and other points, universities and private schools are also efficiently maintained.

New Brunswick is crossed by three trunk railway lines, the Intercolonial, the Canadian Pacific, and the recently constructed Transcontinental. These are the great carriers of the products of middle and western Canada on their way to the

*James Alexander Murray: born 1864; Mayor of Sussex, (N.B.), 1906; elected to New Brunswick Legislature, 1908. Minister without portfolio in the Fleming Ministry, 1911; President of Executive Council, 1912; appointed Minister of Agriculture, 1914; Acting-Premier of New Brunswick (during absence through illness of the Hon. George J. Clarke), March, 1916.

markets of Europe. They also establish easy communication with the business centres of the neighbouring Republic. Besides the many branch lines connected with and controlled by these roads, there are many local lines owned and operated by private corporations; thus for transportation of freight and for travel the needs of the people are well supplied.

New Brunswick lies between the State of Maine and Quebec province on the west and north-west, and the coastal waters of the Atlantic ocean on the east, and is connected with Nova Scotia on the south-east by the four-mile-wide isthmus of Chignecto. The area of the province is about 28,000 square miles, with a deep-sea coastline of some seven hundred miles in length. Along this coastline, and in the estuaries of rivers which water the country, there are innumerable harbours of vast capacity, easily accessible and sheltered, several of them open to ocean shipping all the year round. During the winter season, St. John, the largest city and commercial capital of the province, becomes the winter port of Canada for Atlantic traffic. Its harbour is one of the best along the eastern seaboard of North America. Here may be seen ships from all parts of the world. Over the trunk railway lines referred to, the agricultural and other products of all Canada are carried to this terminal point for distribution to the markets of the world. This port is, therefore, of commanding importance to business interests, not only in New Brunswick but throughout the Dominion. Several other harbours along the southern coast, yet undeveloped to any great extent, are capable of accommodating the largest steamers. Their merits will ensure these becoming important points of commercial activity in the years to come.

In the waters that surround the province on three sides fisheries of great extent are engaged in, their annual value being about \$4,500,000. Cod, herring, shad, salmon, and mackerel, oyster, lobster, and other shell-fish abound. The possibilities of extension of the fishing and correlative industries are almost unlimited. The waters of inland streams also teem with fish of a quality and flavour unsurpassed.

The surface of New Brunswick is of a diversified character—hill and valley, level and undulating areas, marsh, intervalle, and meadowlands, each with many graduations. Most

of these are well watered and fertile, millions of acres being well adapted for agriculture. While most of the surface of the province is still in its natural condition, the areas cultivated yield products to the value of about \$21,000,000 annually. In view of its fertile lands available for settlement and its advantageous position to markets New Brunswick is eminently adapted to great agricultural expansion. While the areas of the West may be best adapted for grain growing, New Brunswick is eminently a country suited for mixed farming. Dairying, stock-raising, horticulture, root productions, and grass crops in well balanced proportions yield to the industrious and intelligent worker profitable returns.

A watershed running through the province divides the streams flowing to the Bay Chaleur and the Gulf of St. Lawrence from those emptying into the Bay of Fundy. The rivers are profusely branched, facilitating drainage of the soil, contributing to its fertility and insuring an abundant supply of good water easily obtained for household and industrial uses. Along the banks of many rivers, from the water's edge to their sources and for very many miles back into the country, are stately forests of pine, spruce, hemlock, fir, cedar, maple, birch, poplar, and other varieties still untouched by the lumberman's axe. These are owned chiefly by the province and are known as Crown Lands. Under careful control, with regulations that safeguard the province, this resource stands not only as a constant means of revenue, but as the perpetual foundation of a permanent manufacturing and export industry, offering employment to people by thousands in excess of those now engaged in it. At the present time these forests supply the basis of a provincial industry of the annual value of \$7,500,000.

The rivers supply an inexhaustible source of power for manufacturing purposes; they are not sluggish streams, nor yet are they tumbling torrents, with rough and rocky banks, offering no convenient sites for the foundation of industrial plants. From the Grand Falls, where the entire volume of the water of the giant St. John River at that point drops through a gorge 250 feet wide over a precipice 74 feet deep, to the many cascades of small dimensions on numberless streams, so generously distributed by the hand of Providence,

there is power enough to drive the wheels of industry to manufacture the products of a continent. Few of these are yet utilized, the total value of our manufactured products at the present time not exceeding \$40,000,000. It remains for the oncoming generations, taught to perceive in this natural resource untold opportunities for industrial expansion, to place New Brunswick in the front rank among the sections designed for great manufacturing achievement.

Our mineral resources are yet but slightly developed. Coal occupies the leading place in such products. In Queens, Sudbury, Kent, and Albert counties large deposits have been extensively worked. Immense deposits of iron have been discovered in Gloucester county, and extensive preparations have been made for developing the industry on a large scale. Copper in Westmorland and Albert, antimony in York, manganese in Kings, gypsum, oil and natural gas in Albert, and granite in Queens and Charlotte, represent generally the extent and variety of minerals known in the province. Our opportunities in these respects are largely before us. The entire value of the output in 1914 amounted to \$1,034,706.

New Brunswick's population at present is 351,000, less than a tithe of that it is capable of supporting. Immigration has largely passed through our doors *en route* to the West. Owing to the building of the Canadian Pacific Railway and the opening up and organization of our great western provinces, the western portions of the Dominion have in recent years received the bulk of the incoming thousands.

Not only have immigrants passed by us, but, lured by the spirit of adventure, many of our own sons and daughters have joined in the procession. With those from other provinces who have gone to the West, they are contributing their share in the influences, that are fashioning into a homogenous Canadian citizenship the mixed races that have come to our shores seeking homes for themselves and their children. From our sparse population we have given our quota towards the making of a great Canada.

Of our future we entertain no doubts; it is full of promise. On the shore of the Atlantic, across which the crowded millions of Europe are calling for the products of our industry, we have an advantageous location, splendid natural

conditions for manufacturing industries, fertile soil for agriculture, immense forests, and boundless fisheries. With a populated West behind us, with the best of shipping facilities about us, with a climate admirably suited for immense agricultural development, with an intelligent appreciation of our resources and their adaptability to progress, we cannot fail to possess the land in comfort and prosperity.

The government of the province is planning to put into effect when the war is over, a broad and comprehensive scheme, whereby generous provision will be made to those who, retiring from military service under the flags of Great Britain and her allies, desire to settle upon the land. For all such New Brunswick has ample room and abounding opportunities.

THE OLD AND THE NEW

BY THE HON. WALTER MITCHELL, M.P.P.*

THE OLD. "Old Quebec" was "New France" in the bygone days, prior to the historic thirteenth of September, 1759, when Brigadier-General Wolfe, at the head of an expedition against Quebec, defeated the French on the Heights of Abraham, and died in the hour of victory. The last act of Montcalm, the French Governor of Canada—who also lost his life on the Heights of Abraham on that memorable September day—was to write the British commander: "The humanity of the English sets my mind at peace concerning the fate of the French prisoners and the Canadians."

Montreal surrendered in 1760, and by the Treaty of Paris, Canada became a British possession in 1763.

Subsequent to the Treaty of Paris, most of the French nobles and military men—both officers and rank and file—and many of the richer merchants, returned to France, leaving the *trappeurs*, *coureurs de bois*, or *voyageurs*, as the pioneers or explorers were variously termed, a few *seigneurs*, and the *habitants*.

Those sturdy pioneers of old were great men. The greatest of them all, perhaps, was Champlain, in honour of whom Lake Champlain—discovered by Jean Nicolet, in 1634—was named. Brébeuf and Chaumonot discovered Lake Erie in 1640; Lake Superior was located by De Groseilliers in 1659; the Hudson's Bay Territory was discovered by Father Albanel in 1671, and the Mississippi by Marquette and Jolliet, in 1673. Another missionary-explorer, Father Hennepin, first set eyes on the world-renowned Niagara Falls, and Pierre Gaultier, in 1733, in the days when western Canada was practically an unknown wilderness, was the first white man to climb the

* Walter George Mitchell: born 1877; took his B.C.L. degree and was called to the Bar, 1901; K.C., 1912; represents Richmond county in Quebec Legislature; appointed Provincial Treasurer, 1914.

Rockies. Walt Whitman, maybe, had these very worthies in mind when he wrote:—

Have the elder races halted?
Do they droop and end their lesson, wearied over there beyond
the seas?
We take up the task eternal, and the burden, and the lesson,
Pioneers! O pioneers!

All the past we leave behind,
We debouch upon a newer, mightier world, varied world,
Fresh and strong the world we seize, world of labour and the
march,
Pioneers! O pioneers!

We detachments steady throwing,
Down the edges, through the passes, up the mountains steep,
Conquering, holding, daring, venturing as we go the unknown
ways,
Pioneers! O pioneers!

We primeval forests felling,
We the rivers stemming, vexing we and piercing deep the mines
within,
We the surface broad surveying, we the virgin soil upheaving,
Pioneers! O pioneers!

To recount the fighting between the French-Canadians and the various Indian tribes who were constantly attacking them in the early days, would fill a volume.

The *habitants*, or small farmers, who, perhaps, composed the greater part of the "settler" population of that day, were the men who really colonized Quebec and cultivated the land. In those far-off days before railways were dreamed of, the highways were the rivers, and transportation was by canoe. It was for this reason that the farms generally had narrow waterfronts, and reached a mile back from the river. Behind these mile strips were forests illimitable. To this day, practically little beyond the river-fronts has been peopled.

The *habitant* of to-day lives a simple, happy life, generally raising a little live stock, a little farm and dairy produce—and a big family.

THE NEW. In the statement of the revenue and expenditure of the Province of Quebec for the fiscal year 1915-1916 it was shown that the ordinary income of \$9,597,000 had sufficed to provide for all the outlays of the Government on administrative services, for certain special charges not liable to recur, and for nearly \$700,000 voted for patriotic works necessitated

by the war. There was still a balance to the good to carry forward. No special taxation had been levied to meet unusual conditions caused by the war. The expansion of the revenue that made such a state of affairs possible was chiefly the result of the growing population and expanding trade interests of the province.

Perhaps the people of Quebec do not advertise their province as well as they might. It is only when the census figures are given to the public once in ten years that its right to be called one of the progressive members of the Confederation family is made clear. The records of the twenty years show its standing. In 1891, Quebec had a population of 1,488,000. In 1911 the population numbered 2,003,232. The increase of 515,000 was greater than that of any other province in the same period. The conditions which produced such results between 1891 and 1911 are still operative.

Situated on the Atlantic seaboard, with the wide and deep channel of the St. Lawrence navigable for the larger class of ocean steamships, the business houses of its cities serve the trade of practically all Canada, and when prosperity rules anywhere some of the advantage comes to Quebec. Its resources are varied and staple. Its farms, its forests, its fisheries, and its minerals, show a steadily increasing production. In the matter of water-power it is rich, probably beyond any region of its area in North America. The St. Lawrence River, the Ottawa River, and its tributaries, the St. Maurice, the St. Francis, and many streams have been harnessed for the production of electric power, to serve the industrial, transportation, and domestic needs of the community. Montreal is among the chief users of water-produced electric current in the world; some of its growth in recent years has been due to the development of power plants within an area of a hundred miles, and the application of electric energy to industrial service. Montreal's experience is being repeated in varying degrees by other cities throughout the province.

The development of electric power has been on sound lines. No money of the province *per se* has been invested, and no pledge of provincial credit required. The government has, with the sanction of the Legislature, adopted a policy of leas-

ing power sites on reasonable terms, and private enterprise assumes all further responsibility. The good results are wide-spread. In four years Three Rivers has increased in population from 13,000 to 19,000, Hull from 18,000 to 22,000, Sherbrooke from 16,000 to 19,000, Thetford Mines from 3,250 to 7,000, Jonquieres from 2,300 to 4,200, Grand Mère from 4,200 to 6,500. These are typical instances. They indicate a general growth that neither creates, nor suffers from, booms.

Quebec's leading industries, with few exceptions, represent the production of articles of everyday use, the consumption of which is least affected by untoward trade conditions. The census of manufacturers shows this province to be in the forefront in the production of pulp and paper, of cotton fabrics, of boots and shoes, of sugar, and of railway rolling stock. In most of these, large investments of capital are required, and Quebec has been fortunate in having men of enterprise ready to take the necessary risks of the business in which they are concerned, and by their own endeavours to win success. The province has been fortunate also in the intelligence, industry, and fair spirit shown by its workers in their relations with employers. This phase, which has been noted elsewhere than in Canada, is in keeping with the general attitude of the people towards commercial enterprise, and is a beneficial factor in the general situation.

Quebec, in the matter of agriculture, shows excellent progress. The census records are in proof. In 1901 the land in farms was put at 14,444,000 acres. In 1911 it was 15,613,000 acres. The increase of 1,169,000 acres was at the rate of 8.09 per cent. In the matter of farm values, the growth was even more noteworthy. In 1901 the census record credited the province with farm property of all kinds of a value of \$436,076,000. By 1911 this had grown to \$787,076,000. The increase of \$351,677,000 was equal to 80.65 per cent. The growth was in all divisions, land, buildings, implements, and live stock. Such growth is the result of intelligently applied industry. It means increase in the capacity for creating wealth and in the amount of created wealth, and is also a strong sustaining force behind the general trade of the province. It is interesting to note the comparative smallness of the extent to which farms are mortgaged. The profits made

are available for farm improvement. Quebec farmers are also learning the value of co-operation. Some, without any aid from outside, have established co-operative banks; some have applied co-operative principles to the sale of wool and other articles of produce. In the dairy branch, in which Quebec products have a high reputation, co-operation has long been the rule. This advance in agriculture, with industrial expansion noted, has had its effect on general trade. The number of branch banks in Quebec has been increasing even at a time when banks were inclined to avoid any extension that looked at all likely to unduly increase their expenditures. In the year 1915 there were opened in Quebec 119 branch banks, while only 25 were closed.

The general progress of the province is aided by a system of technical instruction. The farmers of the province have the advantage of the great Macdonald Agricultural College at Ste. Anne's, where there is at their command the knowledge and experience of a highly capable staff of experts in every branch of husbandry, whose work is appreciated even beyond Canada. There are also agricultural schools at Oka, and at Ste. Anne de la Pocataire, where technical knowledge that helps to the improvement of farm practice is made available for all concerned. At St. Hyacinthe a dairy school has been doing useful work for years. All this makes for solid and permanent growth.

There has been lately put in operation at Montreal the largest technical school in Canada, where young men are instructed in the principles and details of the crafts they have chosen to follow as a means of livelihood. In the city of Quebec is a like institution. Their work, which is in continuation of that long carried on in a smaller way, is having its effect in increasing the skill and value of those who follow the mechanical arts, an advantage of permanent value to the people. There is also in Montreal a school for advanced commercial studies, where pupils are instructed in all that makes for efficiency in the management of business affairs.

Conservation work has been appreciated at its full worth in Quebec. The forests, whether owned by the province, or by private interests, are protected by laws designed to save them

from wasteful exploitation or needless danger. Extensive works have been designed to maintain the needed volume of water in the streams for power or navigation purposes. The fisheries are carried on under regulations designed to prevent depletion of the waters.

Allied to the work of conservation is the development of a system of good roads. The government builds some roads, and is liberal in the assistance it gives to municipalities in regard to others. Up to the close of 1915, under authority of an Act passed in 1912, \$8,162,000 was advanced to municipalities, while direct payments for government constructed roads amounted to \$4,137,000. The result is noted in a general improvement in the conditions of the main thoroughfares for vehicular travel. This road improvement work is the only occasion for recent borrowings by the province; and both interest and sinking fund for redemption of the loans are being provided for without any increase in taxation.

What is thus outlined speaks for itself. The progress of the province has been on sound lines. The more people there are in the country, the greater will be the steady demand for the main products of its forests, its fisheries, its mines, its farms, and its factories. Its development has been along lines which are least affected by commercial disturbances. It passed through the first year of the war, when trade conditions were least satisfactory, without being compelled to resort to unusual legislation, to new taxation, or to special borrowing. Its financial institutions are able to care for any sound enterprise, no matter how large, that has good men behind it. Its cities have excellent means of communication with all parts of the country and with the outside world. It has people of knowledge, courage, and enterprise behind its mercantile and industrial institutions. Quebec can look forward to the future with confidence, irrespective of any conditions that may temporarily prevail.

CANADA'S INLAND SEAPORT

MONTREAL AND ITS OCEAN TRAFFIC

BY THE EDITOR

Canada is a big country of big things. In no way is this better exemplified than in her transportation facilities.

The port of Montreal, her chief shipping centre and the head of her ocean navigation, is nearly a thousand miles from the open sea. A thousand miles does not seem so very far in Canada, but it is nearly three times the distance between London and Edinburgh! Hamburg—in pre-war days the greatest port in continental Europe—is sixty-five miles up the Elbe, Montreal being distant from the Atlantic ocean about fifteen times as far as Hamburg is from the North Sea.

At the time of the Franco-Prussian war, some parts of the St. Lawrence channel, at low water cleared only twelve feet; to-day the entire ship channel has a minimum clearance of thirty feet, splendidly buoyed and lighted from harbour to ocean. When one remembers that this clearance exceeds that of the Elbe to Hamburg, that it exceeds the channels to Havre and Rotterdam by a foot, and the Manchester ship canal by no less than two feet, one can easily appreciate, after a careful study of conditions, that, for accessibility, Montreal compares favourably with some of the principal ports of the world.

Owing to the freezing of the St. Lawrence during the rigorous winters, the season of navigation is limited to between seven and eight months, generally speaking, from the latter part of April till the second or third week of December.

The tonnage of vessels at this port aggregated three millions in 1900; six and a half millions in 1910; nine millions in 1914, and, roughly, six and a half millions in the exceptional year of 1915.

Up to date some twenty-five million dollars have been spent

—perhaps “invested” would be the more correct word to use—in the development of the harbour generally, including the deepening of the ship channel to which reference has been made. That this money has been carefully expended, considering the results achieved, will be seen by reference to similar expenditure on some of the great European ports.

Two hundred million dollars have been spent on the port of London; \$155,000,000 on Liverpool; \$115,000,000 on Hamburg, and the work is not completed yet. Manchester cost a hundred millions; Newcastle, ninety; Antwerp, sixty; Glasgow, fifty; Rotterdam, a similar amount; Marseilles, forty; and Havre, thirty million dollars.

Wise harbour development is unquestionably a national asset. Merchants and shippers have no sentiment. Trade goes where facilities are easiest and best. In this respect, Montreal is in front of some of the principal ports of both Europe and America. At the point of interchange of ocean and inland shipping, served by three great transcontinental railway systems, Canada's commercial capital should hold her own against the claims of any port in the New World.

About two million dollars were expended, in 1914, in dredging, building additional sheds and wharves, and general renovations. To use a colloquialism, eight miles of wharfage, with a hundred berths for vessels of various sizes, is “some” accommodation. Montreal is to-day the third largest port in the British Empire, London and Liverpool being first and second.

The Harbour Commissioners' staff includes a special police force, whose members attend the arrival and departure of every vessel, with the result that not a single theft was reported during the year just referred to, nor was there any case of assault within the precincts of the harbour.

The forty miles of railway tracks, albeit in constant use day and night, were entirely free from accident—something to be proud of on the American continent.

Among the commissioners' plant are ten tugs, six dredgers, seven derricks, five locomotive cranes, a 75-ton floating crane, and about forty scows.

Water-borne freight is cheaper than rail, and the carrying power of the great inland waterways of the Dominion will

be considerably augmented on the completion of the new Welland Canal, now under construction by the government. The amount already spent in the improvement of Canada's canal system totals, I believe, some \$200,000,000, or, roughly, £40,000,000 sterling.

In order to study every phase of the situation, and prepare for the anticipated increase of water-borne commerce expected between the Atlantic and Pacific coasts, *via* the Panama Canal—by which route a saving of 8,000 miles and a month's steaming time is effected—a tour was made early in 1914 by three officials of the Montreal Harbour Commission, Mr. W. G. Ross, president, Mr. F. W. Cowie, chief engineer, and Mr. M. P. Fennell, Jr., assistant-secretary. This tour, which extended to three months, covered a wide range of investigation. Among the ports and dock-yards visited were those of London, Liverpool, Manchester, Bristol, Hull, Glasgow, Leith, Rosyth, Southampton, Havre, Marseilles, Antwerp, Hamburg, Rotterdam, and Genoa. One of the many interesting features met with was the splendid facilities at British ports for the handling of perishable imports from Canada.

Mr. Ross, Colonel Labelle, and Mr. Fennell, in September, 1915, also made a tour of inspection of the ports of the Pacific ocean, from San Diego to Prince Rupert. At most of these, considerable development is in progress in keen anticipation of the great volume of trade the Panama is to bring. It is obvious that the Montreal port authorities have a pretty intimate knowledge of conditions existing at the principal ports of the world, which must be of inestimable value in helping to solve the many problems incident to the development of their own port and Canadian transportation.

Excluding pleasure steamers, nearly a thousand vessels—with a tonnage of just under three millions, and navigated by some sixty-three thousand men—came into the harbour in 1914. It is worthy of special note that more than three-quarters of these ships, with more than three-quarters of the tonnage just named, were British.

Added to these figures were over twelve thousand "inland" vessels, with a tonnage exceeding six millions.

For the year ending December 31st, 1915, the total tonnage of the 484 trans-Atlantic ships, 331 from the Maritime Pro-

vinces, and 8,572 "inland" vessels which arrived in the harbour, amounted to 6,483,700.

The rapid growth of trade in recent years is well illustrated by comparison with the entries of 1911, in which year, although more than twelve thousand boats arrived in port, their aggregate tonnage just exceeded six and a half millions. Within four years we find the figures increased by nearly 40 per cent.

On August 18th, 1911, twenty-four sea-going vessels were in port, the greatest number at one time during that year; boats under the same category to the number of fifty-six were registered on August 21, 1914. These figures speak for themselves.

The following table, showing the principal exports of produce, in 1914, may serve a useful purpose:—Wheat, 61,484,474 bushels; oats, 8,536,589 bushels; barley, 4,552,273; rye, 335 030, and flaxseed, 177,066 bushels. Of flour there were 2,762,139 sacks, and of meal 36,463 sacks; 113,339 cases of eggs; 7,228 boxes of butter, and 1,482,958 of cheese; 468,483 barrels of lard; 4,180 packages of hams and bacon; 96,039 pounds of meat; 175,597 barrels of apples; and 495,966 bales of hay.

Grain shipments from Montreal in the same year, compared with the six principal ports of the United States, give figures not less interesting, particularly when the short season here is borne in mind, against the full year in the States. They were, in bushels:—Montreal, 75,085,432; New York, 64,532,190; Baltimore, 45,000,000; Galveston, 35,821,506; New Orleans, 34,624,000; Philadelphia, 23,294,252; and Boston, 16,555,340.

Investigations were recently set on foot concerning the cost of handling grain in European ports, the result showing Montreal in a very favourable light. Comparison between London and the Canadian port gives the charges at the former point as three and a half times those of the latter:—

PORT OF LONDON AUTHORITY

Working out, receiving from ship, weighing at delivery, and delivering within 14 days, 4s. 4d. per ton, or two and 4-5th cents per bushel.

MONTREAL HARBOUR COMMISSIONERS

Working out (shovelling), elevating, weighing, storage for 9 days, weighing, and delivering by conveyors into ocean ships, 4-5th of one cent per bushel.

Power is cheaper here, but London has more than compensating advantages, in that elevator construction costs less, and operating expenses are lower. However, there are the facts, and facts are stubborn things.

The record of the Harbour Commissioners' elevator system, from 1907 to 1915, in bushels of grain handled, reads:—1907, 1,078,289; 1908, 8,661,350; 1909, 11,691,071; 1910, 21,526,727; 1911, 21,007,164; 1912, 25,561,655; 1913, 44,000,000; 1914, 62,250,000; and 1915, 37,317,367.

The figures for 1915, if taken at face value, and without consideration of the abnormal conditions then existing, would constitute—in this particular phase of activity—a disappointing showing to record. This, however, should not be considered in relation to the efficiency of the elevator system, but, rather, to the inadequacy of ocean tonnage to carry the grain away. In this lack of tonnage Montreal was not alone. Throughout the latter part of the year many of the great railroad systems of the United States were compelled to declare embargoes on certain classes of commodities, out of New York, Philadelphia, and other ports where tonnage was not available.

However, notwithstanding the British Admiralty having commandeered, and retained throughout the entire season, an important section of the fleet, which would otherwise have been used for supplying Montreal, the result of that season's business, generally, can be viewed with a good deal of satisfaction.

Shippers and the general public, to whom a steady flow of commerce between Canada and Great Britain means so much, must feel deep gratitude to our truly magnificent navy, which alone makes it possible to maintain uninterrupted communication with the Motherland.

The construction of the present system of transit sheds, with grain conveyors to each berth, has effected a great improvement. These conveyors can deliver grain over ten miles of belting at the rate of 60,000 bushels an hour.

That Canadian grain handled has already increased to an amount more than seventy times as great as that of nine years ago, is, indeed, a record.

A considerable volume of trade with Germany, Austria,

and Belgium was terminated by the war. In 1913 this totalled some thirty million dollars, by no means an inconsiderable item. Phoenix-like, Belgian trade will revive in due course, and as to the Central Powers, what is lost on one hand will be gained on the other.

During the year ending March 31st, 1914, Canada imported from Germany, roughly, fifteen million dollars' worth of goods. Exports to that country totalled about four and a half million dollars. The imports will probably be superseded in future by goods obtained elsewhere, doubtless in part from domestic sources, and in part from Great Britain, though the United States will undoubtedly make a strong bid for the business.

Canada's trade for the fiscal year 1915-1916 reached the enormous total of \$1,424,000,000. This shows an increase of \$346,000,000 over the record total of the previous year.

Heavy increases are shown in nearly all classes of exports, the total value of exports of domestic products being \$741,000,000, as compared with \$409,000,000 in the previous year. Imports of dutiable goods amounted to \$289,000,000, and of free goods, to \$218,000,000, against \$279,000,000 and \$175,000,000 in the previous year.

Exports of manufactures rose from \$85,000,000 to \$242,000,000, of agricultural products from \$134,000,000 to \$250,000,000, and of animal products from \$74,000,000 to \$102,000,000. Other exports were: fisheries, \$22,000,000; minerals, \$66,000,000, and lumber, \$51,000,000.

In connection with Montreal harbour, I must not omit reference to the "Duke of Connaught" floating dry-dock, built and operated by Canadian Vickers, Limited. This splendid feat of engineering, with its 30-foot draught, and lifting capacity of 25,000 tons, is capable of accommodating the renowned *Queen Elizabeth*, the largest ship of the British navy.

The Vickers naval construction works, under the same control, are capable of building any vessels, from a dinghy to a dreadnought.

In a judicial summing up, the reader will, I venture to think, agree with me that, with a continuity of able management, the future of the port of Montreal is safe.

THE CANADIAN ASBESTOS INDUSTRY

BY R. POTHIER DOUCET, B.C.L.*

Asbestos is one of the most marvellous products of nature. The fiercest heat cannot consume it; exposure to ordinary acids will not affect the strength of its fibres, even after days of exposure to their influence.

It was mined by the Romans in the Italian Alps, and woven by them into fabrics of various sorts and for many uses, including cremation cloths and napkins. Specimens of their wonderful skill in the weaving of asbestos may be seen to-day in the Vatican and museums abroad. It may be said, though, that these early efforts were purely experimental, and served no real and lasting purpose. Moreover, the Italian asbestos was not suitable for weaving, and the uses of the finished article were practically nil—consequently, the wonderful properties of this mineral lay dormant for centuries, and it was only in the latter part of the last century that it began to come into its own and to occupy the position that it deserved in the arts and trades of the universe.

To-day, owing to its indestructibility, fireproofing qualities, non-conductivity of electricity, etc., its application is almost universal, and the electrical, chemical, mechanical, and building arts of the world call on Canada for asbestos in greater and greater quantities.

The United States, England, France, Belgium, Spain, Italy, Germany, Austria-Hungary, Australia, and Japan are employing, to-day, thousands of hands in its manufacture, and it is to the Eastern Townships of the Province of Quebec that

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they must come for the bulk of their raw material. As a proof of this, it may be said that, in 1913, the world consumed about 155,000 tons, and of this, over 136,000 tons were exported from Canada. To further exemplify the growth, during the last few years, of the uses of asbestos, I may point out that, in 1908, the total consumption the world over did not exceed 75,000 tons, of which about 60,000 tons came from Canada.

It may be said at the outset that asbestos is found in most parts of the world; Canada, Newfoundland, the United States, Italy, Spain, Cyprus, Hungary, Russia, South Africa, Australia, and China have their deposits, but it is chiefly in the eastern part of Canada and the Ural Mountains of Russia, that the mineral can be exploited more or less economically and commercially.

This commercial form occurs in the serpentine group of minerals, and is technically termed "chrysotile". It is found in distinct veins in masses of serpentine, and both the rock and its contained fibre, being serpentine, are hydrous, the average amount of contained water being from 12 to 14 per cent. Chrysotile is principally a hydrous silicate of magnesia, its component parts being silica, magnesia, alumina, ferro-oxide, and water.

The great asbestos district of the world is at Thetford, Quebec. There one finds the quarries of the King's, Beaver, Johnson's, Bell's, Martin-Bennett, and Jacobs groups. At Black Lake, a few miles distant from Thetford, are the British-Canadian properties, and a few miles further away, at Danville, the important deposits of the Asbestos and Asbestic Company are to be found.

From a geographical point of view, the location of all these properties is ideal. Railway facilities and proximity to the sea-board afford advantages to these quarries not enjoyed by other asbestos-producing fields, even if those other fields had the quantity and qualities characteristic of the Quebec serpentine.

New York is 475 miles, Montreal 167 miles, Quebec 75 miles, and Boston 318 miles distant, so that there is immediate access seaward and inland to the largest markets for the material.

It is easy, therefore, to comprehend the relative importance of the Canadian deposits, with their preponderance of fiberized serpentine, proximity to the world's markets, and superior quality of fibre.

As distinct from asbestos occurrences in other fields, those of the Province of Quebec are noted for their superiority, variety, and magnitude. Scientists, entirely disassociated from the asbestos industry, recognize in them a practically inexhaustible supply of inorganic matter, without which the high-pressure epoch, demanding something that will withstand such heat as would destroy any organic material, would be at a disadvantage, and without which fireproofing would be an expensive precaution, instead of an economy.

In the early days of the industry in the Province of Quebec, the energies of those engaged in exploiting the deposits were centered in recovering the long asbestos fibre, commonly known as "crude". This was largely done by hand labour, the rock being blasted out, sorted, the long fibre recovered, hand treated, and then shipped to weavers and spinners, who prepared the finished article. The mass of blasted rock, all more or less fiberized, was discarded, there being in those days no market for the shorter grades; moreover, mechanical means had not been devised to separate these short veins from the adhering rock. As a result, hopes and profits ebbed and flowed according to the quantity of crude recovered in the primitively equipped quarries, and it was only with time, patience, perseverance, and the expenditure of considerable sums of money that the real destiny of the asbestos quarries became known. Mechanical means have been devised, mills erected, and machinery installed to treat the serpentine fibre-bearing rock, and save the short fibres that were, at one time, thrown away. Crude is now in the nature of an extra, and of the whole tonnage of asbestos produced, the proportion of crude to the whole is about four per cent., perhaps a trifle less.

The asbestos deposits in Canada are usually called "mines", but this is a misnomer, as the operations in the pits are those of quarrying, not mining. These pits are large, open ones, and the quarrying is comparatively simple, although regard for the economies is a pre-requisite, where the percentage of fibre to the tonnage milled is from four to seven per cent.,

After drilling and blasting, the broken material is hand-sorted—where no crude has to be “hand-cobbed”, that is, adhering rock knocked off the veins of long fibre with a hammer—all the rock not actually waste and barren is hoisted by gravity inclines, or conveyors, to the mills. There the process is automatic. The crude and the pieces of rock clinging to long fibre are sent to the cobbing sheds to be dressed and classified. It is only in the manipulation of these grades, known to the trade as No. 1 and No. 2 Crude—so called because it is shipped in a crude, or rock-like, form—is manual labour employed in preparing the material for the market, once the quarrying operations are completed.

The mill rock, on entering the mills, is crushed in jaw-breakers and conveyed to dryers. From the dryer an elevator takes the material to be re-crushed, screened, pulverized, and fiberized. It is then treated on shaking screens, the “cotton” being taken up from these by suction fans, and blown into collectors, or settling chambers. The different grades of fibre are made by a final process in sizing machines, or revolving screens. There are a number of these grades, this depending entirely on the uses to which the asbestos is to be put, *viz.*, spinning, weaving, paper, millboard, roofing slates or shingles, boiler mattresses, pipe covering, and so forth.

The production of raw asbestos is to-day to the Province of Quebec its most important mining or quarrying operation. Fully 15,000 people (labourers and their families) depend on its successful exploitation for a living. Time and money have accomplished a great deal, and the industry is now thoroughly established. In time it should grow to still greater proportions, as new uses are being found for it from day to day.

The indestructibility and incombustibility of asbestos are its self-contained virtues. It is a constantly increasing article of economic importance in the arts and trades, and it ranks as one of the essentials. Moreover, its incombustible nature and slow conduction of heat renders it a complete protection from fire. To the ancients its fireproof qualities were no secret. By the modern scientist, as already remarked, it is recognized as a non-conductor of heat and electricity, as well as being practically insoluble in acids. It is one of the indispensables. The best grades are suitable for textiles, and Mr.

J. S. Dillar, of the United States Geological Survey, asserts in a report that "thread can now be spun so fine that it will run about 32,000 feet to the pound". In the electrical arts, asbestos is widely used as a basis of insulation, which must withstand high temperatures; it also is availed of as a fibrous binder for many insulating compositions. It is unaffected, chemically, by many of the active chemical agents likely to attack most insulations; it is generally applied for boiler and pipe coverings to prevent heat radiation, and its efficiency is greatly increased by developing the cellular structure of the covering. A mass of asbestos fiberized and then compressed is highly porous, but it is rendered not only water-proof, but an especially effective insulator, under conditions of varying moisture, by being saturated with certain varieties of asphalt, for example. As a non-conductor of heat it is used not only in the preparation of fireproof safes and vaults, but for cold-storage and cooling structures, and also for theatre curtains. Houses made from asbestos materials are not only warmer in winter, but also cooler in summer.

It is hardly necessary to enumerate all the varied uses of asbestos. Let these suffice:—

ASBESTOS-CEMENT SLATES, SHINGLES, AND SHEETS.—These are used for the roofs and side walls of buildings, and are made of asbestos fibre and cement. They are absolutely fire-proof and indestructible. Asbestos being a non-conductor of heat or cold, these slates, shingles, and asbestos boards have great advantages over all other classes of building material. In tropical countries, like Africa, India, and parts of South America, they ensure cool and comfortable dwellings; in colder countries, such as Canada and Russia, where the winters are severe, buildings so constructed have greater warmth than others, and in both instances the extra comfort gained is due entirely to the non-conducting qualities of asbestos. Moreover, this material is acid-proof, ant-proof, and, in fact, everlasting, standing the variations of the most rigorous climate. Repairs are practically nil, and being made in a variety of harmonious colours, it never requires paint. Consequently it is one of the most economical of materials.

FELT. Asbestos felt is used for lining floors, walls, fireproofing, etc., to deaden sound, and to prevent draughts.

CLOTH. Asbestos thread, composed of pure asbestos fibre, is woven into cloth of varying construction, weights, and thickness, which, in turn is made into safety drop curtains for theatres, amusement halls, and the like. Asbestos cloth is also used as a wall-lining, or covering, in some theatres, where municipal regulations for the safety of the public require it, while there is a growing inclination to use it for the production of theatrical scenery generally.

PACKINGS. With the present use of the higher steam pressure in manufacturing processes, the employment of asbestos packings becomes a necessity, as packings made from organic substances burn out and quickly become unreliable.

COVERINGS. Non-heat-conducting coverings for application to steam pipes, boilers, and all heated surfaces, from which it is desired to prevent radiation.

PAPER. The trend of modern architectural and municipal thought is in the direction of fireproofing, or in the employment of fire retardant materials in the erection of buildings, and in this type of construction asbestos paper plays an ever-increasing part.

ASBESTOS FOR COLD INSULATING. There is a large demand for asbestos covering for brine and ammonia pipes, etc., in connection with refrigerating plants.

BRAKE LININGS. For use on automobile brakes, and also largely used for the lining of brake bands and blocks for hoisting engines and gravity incline drums.

ASBESTOS WOOD AND LUMBER. Asbestos building lumber, asbestos wood, asbestos boards, and similar manufactures are employed for fireproofing and for general protective purposes.

PLASTER. For fireproofing construction, the refuse of the mines, known in the trade by the name of "asbestic", consists of a short, fibrous, asbestos sand, and, when mixed with 10 per cent. of the caustic lime, makes a most excellent fireproof wall plaster for either inside or outside work. Its sound-deadening qualities are very marked.

PROTECTED METAL. For roofing, siding, and interior sheathing, car construction, etc.

ROPE. Used for fire departments, etc.; manufactured with a wire core, it is both fireproof and waterproof.

CEMENT. For filling between decks and around magazines,

and all places subject to fire. It is used on the ships of all the navies of the world. As fireproof linings for safes it is invaluable.

FIRE-RESISTING QUALITIES OF ASBESTOS. As an illustration of the wonderful properties of asbestos, the following brief recital will be of interest to architects, builders, and insurance companies the world over. A short while ago a severe fire broke out in one of the large, modern storage sheds of the harbour of Montreal, in which were stored some thousands of tons of loose and baled hay. The building in question was of steel frame construction, on cement foundations, and covered entirely with asbestos fireproofing material. Owing to the very inflammable nature of hay, the fire was intense, but notwithstanding that, the damage the building suffered was very slight, principally the warping of the steel beams supporting the upper floor. The shed where the fire raged was separated from a second one of like construction, by partition walls and sliding doors of this asbestos material. On the outbreak of the fire these doors were immediately closed, and although in the adjoining building there was for hours a seething mass of flames, no damage whatever was suffered in the second building referred to.

This conflagration proves conclusively the wonderful fire-resisting qualities of asbestos. Had the building been constructed of stone, brick, concrete, or corrugated iron, it would have been completely gutted, and the loss a total one. In this case the loss was reduced to a minimum.

France is to-day using considerable quantities of asbestos in manufacturing gloves and shoulder protectors for her soldiers using the quick-firing guns, or mitrailleuse. The rapidity with which these guns are used causes them to get very heated, and at times it is necessary to move them to new positions. Were it not for asbestos, it would be almost impossible to do this, as the men would be severely burned, if they had to handle them without such protection.

APPLE GROWING IN QUEBEC

By T. G. BUNTING, B.S.A.*

The Province of Quebec has long been known for the Fameuse apple, which has thrived for over two hundred years along the St. Lawrence valley, and particularly on the Island of Montreal; to-day it is unsurpassed as one of the finest dessert apples. The origin of the Fameuse is not definitely known, but it is supposed to have been grown from seed brought from France by an early settler. Its high quality and delightful flavour marked the tree as of special merit, and soon it was being distributed quite freely throughout the province, and, as its fame became known, it received even wider distribution, until to-day it is grown from the Atlantic to the Pacific. Many of the old orchards—some of which are upwards of ninety to a hundred years of age, still vigorous and bearing fruit—are yet to be found throughout the province, which amply proves the hardiness and long-lived nature of the tree.

The McIntosh, a younger sister of the Fameuse, also originated in the St. Lawrence valley, in eastern Ontario, some hundred years ago. As a seedling, on the McIntosh farm, it was known favourably for many years, and about 1835 it was propagated and distributed locally, but it was not until about 1870 that its merits became generally known, and it received the attention it well deserved, so that to-day it is equally as well known as the Fameuse, and more extensively grown. It has the high colour, smooth, thin skin, and tender, crisp, and juicy flesh of the Fameuse, but with a characteristic McIntosh flavour. It is this variety that has made famous the Bitter Root Valley of Montana.

*Thomas Gordon Bunting: born, 1885; B.S.A., 1907; specialist in Horticulture, Ontario Agricultural College, 1907; Asst. in Horticulture, Agr. College and Experimental Station, Durham, N.H., U.S.A., 1909-1910; asst. to the Dominion Horticulturist, 1910-1912; Professor of Horticulture, Macdonald College, Quebec, since 1912.

As each large section of country seems to have produced varieties of apples peculiarly adapted to its special conditions, so are the McIntosh and Fameuse peculiarly adapted to the climatic conditions of the St. Lawrence valley, and here they reach their highest colour, and most delicious flavour. Some varieties of apples are not hardy enough to stand the rigorous winters, but the Fameuse, McIntosh, Wealthy, Duchess, Alexander, and others, have stood the test of years and have proven their success. Many other varieties, in fact, too many, are grown in the province, and some of excellent worth, but none can compete in quality and excellence, with the Fameuse and McIntosh. It is these two varieties that are being largely planted at the present time, and they should comprise the major part of future plantings. Both varieties command the highest prices, in their season, on the Canadian and United States markets, and the demand is increasing more rapidly than production, so that during recent years prices have had an upward trend.

The orchard area in the province has not increased to any extent during the past twenty-five years. This is largely due to the removal of old orchards, the lack of organization among fruit growers, and the fact that many growers have not kept pace with modern methods of cultivation—spraying, pruning, and marketing of fruit—but, in spite of this, there are to-day, here and there in the province, orchards of the varieties named that cannot be excelled for quality or quantity of fruit produced. The government demonstration orchards at Rougemont, Abbotsford, Covery Hill, and St. Hilare; the large orchards of Dr. C. W. Byers and Mr. C. E. Slack of Abbotsford, and those at the Oka and the Macdonald Agricultural Colleges, all testify to the high-grade fruit that is produced in abundance, when orchards are well cared for. Apple-growing is not confined to any small section of the province. The more valuable orchard sections are within easy reach of Montreal by rail or water, from which port convenient and cheap transportation may be had to the British markets.

The Pacific coast and inland sections have a great handicap in transportation, owing to the long rail haul across the continent, or longer steam haul by the Panama Canal, a handicap

that will not allow them to lay down their apples on the large eastern, or European markets as cheaply as apples from the St. Lawrence valley.

The soil suitable for orchards is fertile, naturally well drained, and of a warm, gravelly nature, which enables the trees to grow rapidly and to a comparatively large size. At the same time the trees come into bearing early in life, the McIntosh and Fameuse in eight to ten years, the Wealthy and Duchess in from four to six years; in fact, these latter varieties tend to bear heavily too early in life to allow of the best growth of the tree without thinning the fruit.

The cost of land is reasonable, and in many places much below its value as orchard land, and where one locates within easy reach of one of the many transportation lines, connecting with Montreal, the transportation problem is largely solved, even to the British markets. Labour is plentiful and cheap, particularly when compared to the Pacific coast sections.

The problems of choice of varieties, location, orchard cultivation, pruning, spraying, and marketing of fruit are not difficult ones. The Dominion and provincial Departments of Agriculture have available many useful publications bearing on these subjects, and they are always ready to give special information to those seeking it. The agricultural colleges, experimental stations, and fruit growers' associations are doing much to further the interests of the apple growers.

Little need be said about markets and the future outlook for apples. Splendid home markets take the larger part of the local production at present. The Canadian West is calling loudly for Fameuse and McIntosh, and the British market, with cheap water transportation, leaves little to be desired. These markets are rapidly expanding, and with the present reputation of Quebec apples, and an increased output—which could be increased tenfold—the future is extremely bright.

Much has been written during late years about a possible over-production of apples. Should this ever happen, far distant as it is, it will not be such varieties as Fameuse and McIntosh that will go down in the whirlpool of elimination, but the many inferior quality apples of high colour that are now being grown so largely in some sections.

It is possible to establish orchards in Quebec as cheaply as

in any section on the continent, and much cheaper than most sections, on account of the low price of land, cheap labour, and convenience to the markets. These factors, to a very great extent, establish the cost of production of apples, which, in conjunction with the selling price, largely determines the growers' profits.

To the British and other investor, who will turn to Canada on the conclusion of the war, seeking a new home and an opportunity to earn a livelihood on the land, nothing will offer a safer, or more satisfactory investment than apple growing on a large scale, and where one carries on small fruit and vegetable culture, and poultry raising, in conjunction with the orchard, it should produce a steady and ever increasing income.

The old Province of Quebec contains many historic places of great interest, and this should be an added attraction for the investor to stop, see, and investigate before going farther. Perchance, he may see his opportunity in apple-growing along the valley of the St. Lawrence.

ONTARIO'S FUTURE

BY THE HON. W. H. HEARST, K.C., M.P.P.*

To one who is familiar with Ontario, the future of that province is an inspiring subject. Whether we consider its situation, its extent, or its resources, it is impossible to avoid the conclusion that Ontario will, as time progresses, make great strides in material development, and when we remember the origin and aspirations of its people, we can realize that they will constitute a great and stable British community.

Looking at the geographical position occupied by Ontario, the first thought that strikes one is that it is in the heart and centre of the Dominion of Canada, which comprises one-third of the British Empire. It is obvious that whatever the future may have in store for Canada will inure to the advantage of Ontario. That Canada will become more and more the granary of the Empire has long been realized, and that Ontario will participate in this development is as certain as anything can be. Another feature of the situation occupied by this province is the remarkable fact that it stretches as far south as the latitude of northern Spain, and as far north as that of southern Sweden, thus affording a great variety of climate and of products. Geographically, Ontario has an area of 407,262 square miles. The province is eight times the size of England and twice the size of Germany. With a land surface 230,000,000 acres in extent, there has so far been brought under cultivation only 13,500,000 acres. On this area are produced crops and stock yielding \$750,000,000 per annum. Ontario has 202,000 square miles of forests, which yield timber to the value of \$26,775,000 per annum. Her mines yield, in gold, silver, nickel, and other valuable products, \$54,000,000 per year. Her Great Lakes—which are

* William Howard Hearst was born 1864; called to the Bar, 1888; K.C., 1908; elected to Ontario Parliament, 1908; succeeded Sir James Whitney as Premier of the Province, 1914.

like inland seas—carry ocean freights a thousand or more miles inland, almost to the centre of the continent. These lakes yield fish in abundance. Not less important is the fact that these bodies of water, in flowing seawards, provide motive power for industries, which power is cheapened and made generally available by government control and operation. The importance of this phase of development, for industrial purposes, may be realized from the fact that Ontario to-day has 16,000 factories, with an annual output amounting to \$579,000,000.

These facts point to the great wealth and productiveness of the province, so far as development has progressed, but as yet its production has been confined mainly to the older settled portions. The vast northern districts, hitherto to a great extent inaccessible, are now being pierced from end to end by two new transcontinental railways. These two systems will open up for settlement some 16,000,000 acres of excellent land—a larger area than older Ontario has at present under cultivation. Most of this land is well wooded, and the necessity of clearing it before crops can be raised makes the settlement of Ontario slower than that of the prairie lands of the West; but, on the other hand, Ontario has the advantage of abundance of building material and fuel, and a great standing crop of timber waiting to be harvested by the settler. This will afford him an income from the beginning.

Apart from the material aspect of the subject, Ontario's future is of great interest. The province, like all Canada, is thoroughly and heartily British in sentiment. Its original settlers were United Empire Loyalists, who left home and comforts in the country to the south at the time of secession, and came to what was then a wilderness, in order that they might remain under the British flag. In the great tide of immigration which has flowed from England for the past few generations, those who preferred British institutions to all others came to Canada rather than to the United States. It will thus be seen that, at its inception, and in its development, Ontario has progressed along British lines, and hence its motto, adopted officially only a few years ago, is that of the Loyalists who were its founders: "*Ut incepit fidelis sic permanent*", "*As it began faithful, so will it remain.*"

OPPORTUNITIES IN ONTARIO

BY THE HON. G. HOWARD FERGUSON, K.C., M.P.P.*

A great many articles have been written, and a still greater number of opinions have been expressed, as to what will happen in Canada when the present war has been satisfactorily settled by the success of the allied forces. Amid all these multitudinous utterances appears the one common belief, that when peace has been finally declared, the Dominion of Canada, with her great natural resources and abundant opportunities, will be the most outstanding country in the world to which the thought and attention of the people of Europe will turn. The splendid record made by our Canadian soldiers in Flanders, and elsewhere, cannot but create in the minds of the peoples of the world, the thought that a country, which can produce such a class of men, must be a desirable one in which to live. That there will be a great exodus from war-stricken Europe is a foregone conclusion, and that Canada will be the "Land of Promise", to which many will turn their faces, seems to be a settled conviction.

With this knowledge, then, it becomes our problem to prepare for their coming, and to be ready to direct them intelligently on their arrival.

Space is not available in an article of this nature to deal with the Dominion-wide opportunities that await every man, who is honestly desirous of making the best of the many advantages that our country offers. I believe, however, that to a great portion of those who seek new homes in this country, the agricultural advantages which the Province of Ontario offers will be an outstanding attraction. More particularly do I believe that in this banner Province of Ontario the newer

*George Howard Ferguson: born 1870; B.A., 1891; LL.B., 1892; called to the Bar, 1894; K.C., 1906; has sat in Ontario Legislative Assembly since 1905; assumed the duties of Minister of Lands, Forests and Mines in the Hearst Government, 1914.

part, commonly called "Northern Ontario", offers to the new-comer greater natural advantages than any other part of this great Confederation of provinces.

Our wealth of forest and of mine, our fertility of soil and beauty of landscape, our lakes and rivers teaming with fish, our mighty water-falls only awaiting the capital to develop, our ever expanding manufactories, together with a healthy and bracing climate, offer to all, the rich and the poor, the professional man and the artisan—and, I believe, particularly to the agriculturist—an opportunity equal to, if not surpassing, any other part of the Dominion.

We expect, very shortly, to have on our statute books an Act enabling the government to assist the actual settler by cash advances, or otherwise, to as great an extent as any government has ever gone, in addition to a free grant of 100 to 200 acres, under our Homestead Act. The man of means, who may not wish to settle permanently on the land, but who is desirous of owning a good farm, can obtain a location and perform his settlement duties by proxy.

Some of the advantages awaiting the settler in the newer parts of the province deserve special mention. The government has already a special fund of five million dollars, which is being used primarily in the building of highways through northern Ontario. Parts of this fund will be devoted to such other undertakings as time, experience, and conditions indicate are to the advantage of the incoming settler. Liberal aid is being given to the erection and maintenance of schools, and the general improvement of the social and educational conditions of the people.

In addition to this special fund, the province votes large sums each year for the building and up-keep of what we call colonization and trunk roads—such last-mentioned sums being taken from the general revenue. Besides this, generous expenditures are made in the promotion of agricultural interests, and in the spreading of a wider and more practical agricultural knowledge, by way of Experimental Farms, Agricultural Colleges, and District Representatives. These District Representatives are appointed from men—the sons of farmers—who have been specially trained at the Provincial Agricultural College. They make personal visits to the homes

of the various farmers, hold public meetings, and in every possible way disseminate amongst the agriculturists the benefit of the special knowledge and training referred to.

Heavy as have been these expenditures in the past, we realize that it will be our duty to see that even greater provision is made for the future, and we have every confidence, owing to the progressive spirit of our people, that such further expenditure, as the changed conditions caused by the war require, will be freely and gladly met.

The development of our great natural water-powers is a question that demands our continual attention. The solution of the country's problems at the close of the war will depend largely upon the settlement of the land. The extension of the present hydro-electric power system, to enable the farmer to enjoy the benefits of cheap power and light, is one of the first problems to be worked out. It has not been fully realized what may be done in this direction by electric energy. It seems to be the thought in a great many minds, that this development is only for the residents of cities, towns, and villages, but, the furnishing of electrical power to the farm is of greater importance. When it is realized that this power is already being transmitted to the agricultural sections at actual cost, and that it may be used to do almost all kinds of work on the farm for which power is required, the importance of the development of this great natural asset will be more fully appreciated. It is by no means a figment of the imagination to say that the time is not far distant when, in almost every portion of this enormous province, electrical energy will be used on the farm—for cooking, lighting, heating, and for operating every kind of machinery. It is already being applied in a limited way for the operation of the threshing machine, the grinder, the milking machine, the cream separator, the washing machine, and even the sewing machine. It is our duty to see that this province maintains its lead in agricultural production, and to that end I would urge that the energies of the people be directed to the continued development of our electrical enterprises, through the Hydro-Electric Commission.

Then, too, we must not lose sight of the fact that nature has been particularly kind to us in placing on our great agri-

cultural areas, as a first crop, an abundant supply of valuable timber, which offers the settler profitable employment, and for which he finds a ready market at the various sawmills and pulp mills.

It will be our duty to see that, as circumstances warrant, additional areas are opened up from time to time, and to see that adequate means are supplied by way of transportation and the establishment of further industries, to ensure that our raw materials will be manufactured within our own province, and sent to the markets of the world as finished products. By such a policy we can create a great industrial expansion, providing employment for an ever increasing population, and at the same time extending the existing home market for the products of the farm.

With millions of acres of some of the finest agricultural land in the world practically untouched, I believe, that by the development of our great northern heritage, Ontario will some day be the home of the most prosperous agricultural community to be found anywhere on this continent.

We shall handle our problems in Ontario with full confidence in the future, realizing that by creating a great and contented agricultural army on the soil, we are rendering a real service to the men who may be fortunate enough to find a home in this great Dominion of Canada.

COBALT AND PORCUPINE

BY ARTHUR A. COLE, M.A., B.Sc., M.E.*

In the summer of 1868, on an islet some eighty feet in diameter, about a mile out from Thunder Cape on Lake Superior, was found the famous Silver Islet mine, which in its short career produced \$3,250,000. This was an earnest of what the great Northland's storehouse contained, but it was so long before another rich silver deposit was found that prospectors began to despair of ever duplicating Silver Islet.

In 1902 the Ontario Government decided to build a colonization railroad northward from the Canadian Pacific Railway at North Bay, for the purpose of opening up what is known as "The Great Clay Belt" of Northern Ontario. With the meagre information then available, it required considerable courage and optimism to foresee this colonization railroad as a paying investment, even in the far distant future.

To reach the southern border of the Clay Belt required the construction of over a hundred miles of railway, through a country whose only apparent promise of future freight revenue was from the lumbering industry. Before the line was completed, however, a discovery was made which changed the whole aspect of the government's investment. Almost within sight of the rich farm lands of Timiskaming, the first silver finds were made at Cobalt by members of the railroad construction parties. From this time forward the mining industry became the most important revenue-producer for the Government Railway, and it is likely to hold this lead for many years to come.

The Cobalt silver deposits proved to be enormously rich,

* Arthur Augustus Cole: born 1871; graduated McGill University, (B.A., 1891; B.Sc., 1894; M.A., 1897); four years with Geological Survey of Canada; chief chemist, assayer, and mining engineer at the War Eagle and Centre Star Mines, Rossland, B.C., 1898 to 1906; mining engineer to the Temiskaming and Northern Ontario Railway Commission since 1906; President, Canadian Mining Institute, 1916.

but to most investors the history of Silver Islet was unknown or forgotten, and they were very skeptical. Several small shipments were made in 1904, but it was not till the following year that real mining operations were commenced. Interest in the new camp rapidly increased, till in 1906 it reached the proportion of a boom. The district was easily accessible, and it was a novelty for capitalists to be able to reach a thriving mining camp in a Pullman car within twenty-four hours of leaving New York City. The stocks of the producing companies became inflated beyond their real value and carried with them the usual crop of wild-cat schemes. The inevitable crash and slump followed, and for some years afterwards speculation in mining stocks in this district was practically dead. In the meantime the legitimate industry was making steady and rapid progress, as may be seen from the accompanying table of production.

Year	Ounces	Value
1904.....	206,875	\$ 111,887
1905.....	2,451,356	1,360,503
1906.....	5,401,766	3,667,551
1907.....	10,023,311	6,155,391
1908.....	19,437,875	9,133,378
1909.....	25,897,825	12,461,576
1910.....	30,645,181	15,478,047
1911.....	31,507,791	15,953,847
1912.....	30,243,859	17,408,935
1913.....	29,681,975	16,408,935
1914.....	25,162,841	12,765,461
1915.....	23,653,713	11,703,966
Total.....	234,314,368	\$122,754,523

In other words *the Cobalt District is now producing silver at the rate of two and a half tons per working day, or going back thirteen years it has produced over two tons of pure silver for every working day since the camp was discovered in 1903.*

The silver ores of Cobalt are complex and there was no place in Eastern Canada to treat them, so that all the early shipments went to smelters in the eastern United States, only the richer ores being shipped. The ores contained other valuable constituents besides silver, and soon a number of Canadian enterprises were started, of which the two largest are now operating on an extensive scale, producing not only

refined silver, but arsenic, cobalt, and nickel. The principal source of cobalt oxide used to be New Caledonia, but since these Canadian refineries have entered the market, they have driven out all competitors.

The silver-bearing veins were narrow, but as they were taken out and mining development became more extensive, it was found that there still remained a large tonnage of low-grade silver-bearing material that could not pay the high freight and smelter charges without previous treatment. The first concentrating mill started operations in 1907 and others quickly followed, till at the present time there are seventeen operating mills. The tonnage treated increased from 50,000 in 1907 to 700,000 tons in 1915. The average reduction in weight due to concentration is from 45 into one, and as the percentage of values recovered is about 80, the increased value per ton of the concentrate is about 36 times that of the original ore.

Arrangements are now being made for the installation of oil flotation plants for the retreatment of much of the mill tailing, and in this way the recovery of values will be further increased.

Several of the companies have introduced cyaniding into their milling in a more or less modified form, thereby producing bullion instead of concentrate.

The mills mentioned were all for the treatment of low-grade ores and in the meantime all the high-grade ores were shipped to the smelters. Two companies, the Nipissing and the Buffalo Mining Companies, determined to treat their high-grade ore at the mines, so that they would have only bullion to ship, and with this end in view, each erected a high-grade mill. The method employed is a combination amalgamation and cyanide treatment, about 97% of the extraction being made by amalgamation. With these two high-grade mills in Cobalt, and with the Coniagas and Deloro smelters operating in Southern Ontario, most of the Cobalt ores are now treated in Canada, as is shown by the following statement for 1915:—

Cobalt Mills, Amalgamation and Cyanide.....	39%
Southern Ontario Smelters.....	45%
United States Smelters.....	16%
	<hr/>
	100%

With mining costs normal, but the grade of the ore unusually high, the profits were necessarily great. It has even paid some companies to pump out a whole lake, in order to recover the silver from the rich veins in the lake bottom. Twenty-four companies have paid in dividends \$57,600,000, or 47% of the gross production.

As soon as the value of the Cobalt camp began to be understood, it was only natural that prospectors should spread out in all directions from it seeking similar deposits. Their work bore good results for other silver districts. Gowganda, Casey Township, and South Lorrain were found, though none has yet been discovered comparable to Cobalt. As the prospectors pushed north towards the height-of-land, tales of gold discoveries began to come in. The early gold finds all proved disappointing and the old saying that "gold in paying quantities would never be found in Ontario" was often heard repeated. The history of early gold mining in western Ontario, as in the Lake-of-the-Woods District, tended to strengthen this idea.

In the autumn of 1909 promising gold claims were staked in the Porcupine Lake District, 100 miles north of Cobalt and 30 miles west of the Government Railway. In the early winter the trail was crowded with an eager throng with pack-sack and toboggan, an occasional dog team being seen, and a genuine gold rush was in progress. A sleigh road was soon cut through to the new camp and the trip from the railway, that had previously taken three or four days to walk, could be made in one day by driving. Before spring practically every claim for miles around the early discoveries was staked. It was fortunate that the best discoveries soon passed into strong financial hands, so that in the troublous days that followed, before actual production could begin, sufficient capital was available to continue development, without interruption. For some time progress was slow. Supplies had to be put in during the winter to run for the rest of the year. The country was heavily wooded and the overburden frequently deep, so that prospecting was difficult and development slow. With the large number of men in the bush, clearing and prospecting, forest fires became a constant menace in the dry summer months. The summer of 1911 was particularly noteworthy in

this respect. The season was very dry and hot, and fire after fire threatened the mines, burning over the Hollinger property in May and culminating in the disastrous conflagration of July 11th, in which more than seventy lives were lost and almost all the mining and milling plants completely destroyed. It was fortunate that a branch line of the Government Railway had been completed into the district and opened for traffic just a few days previously. Fresh supplies were rushed in and reconstruction on a larger scale was commenced immediately. From that time forward progress has been steady. Production started in 1910 with \$35,000, and had increased by 1915 to \$7,580,000 which is 89% of Ontario's gold production. Ontario now occupies first place as a gold-producing province with a production of \$8,386,956 which is 44% of the total production of Canada.

This is only the beginning. Development has been most encouraging, and each year adds to the extent of the known ore reserves. There are now seven producing companies of which three are already paying dividends. The two largest mines, the Dome and the Hollinger, are making the Porcupine District famous. The Hollinger mine has paid \$4,170,000 in dividends to date, in addition to building up a reserve fund exceeding a million dollars.

Other discoveries have also been made and new districts are coming into prominence. In Munro township, 50 miles east of Porcupine and 10 miles east from the railway, the Cresus Gold Mine shipped two tons of ore that contained \$83,500 in gold, and this along with \$40,000 to be recovered by milling was produced in sinking a small shaft 110 feet deep. At Kirkland Lake, 35 miles further south-east, and 7 miles from Swastika, on the railway several mines are developing, of which the Tough-Oakes, with its narrow rich gold veins, is already a dividend payer. At Boston Creek, ten miles further south, rich gold ore has also been found.

Anyone who looked over the unbroken forest of Northern Ontario a dozen years ago and predicted that this district would soon be producing twenty million dollars in gold and silver annually, would have been put down as a fantastic dreamer. The fantasy of a dozen years ago is a fact to-day and the output is continually increasing.

As yet only a small portion of the country has been prospected. Running north-east and north-west from Cobalt, and extending to the Arctic ocean, is the great Canadian Pre-Cambrian shield, the basement formation of the continent. It contains thousands of square miles and offers to prospectors unlimited opportunities of locating valuable mineral deposits.

Turning from such a past record and looking forward into the future, it requires no very vivid imagination to see other Cobalts and other Porcupines converting the wilderness into thriving hives of industry, and in turn forming the very best of markets for the produce from "The Great Clay Belt" of Northern Ontario.

THE GREAT CLAY BELT

BY THE EDITOR.

Who is not familiar with "The Great West"? Almost every intelligent schoolboy has drunk deep of its romance, with its red Indians, its cowboys, and its herds of buffalo. Progress during the past thirty years has been so rapid as to alter entirely the aspect of the country. Romance and pioneer work have long since given place to every phase of commerce and agriculture. The growth of its cities and towns has been phenomenal, and the opening up of its natural resources even more so. Almost every thinking adult has studied this progress and marvelled at the wonderful productiveness of the prairie provinces, where wheat grows so tall that a man up-standing in it is well nigh lost to sight.

On the contrary, how many are familiar with Ontario's "Great North", that vast area measuring 330,000 square miles—an area greater than any of the prairie provinces referred to, and more than two and a half times that of the British Isles? Comparatively few.

It might almost be said that New, Northern, or Greater Ontario became generally known only about 1912, when the boundaries of the province were extended by the inclusion of that largely unprospected northland, now called the District of Patricia, so named after the Princess Patricia, daughter of the Duke of Connaught.

In the southern portion of this new land is that strip or belt of between 15,000,000 and 16,000,000 acres, now known as "The Great Clay Belt".

This belt—of which, in round figures, two-thirds, or 10,000,000 acres, will prove to be good farm land—commences at the interprovincial boundary between Quebec and Ontario and extends some 400 miles in a westerly direction, its depth north to south varying from about 25 to 100 miles. The

Transcontinental Railway, at present operated by the Dominion Government, runs east and west through the entire length of the belt.

It is served from the south by the Temiskaming and Northern Ontario Railway, operated by the provincial government, and in the south-western part also by the Canadian Northern Railway. In addition to these facilities, the Government of Ontario has already constructed main roads, exceeding in the aggregate 5,000 miles.

It may not be out of place to note here that in addition to the ordinary expenditure from current revenue, the Ontario Legislature, in the year 1912, set apart \$5,000,000 for development and colonization purposes in Northern Ontario, the money to be expended in such a manner as would best further the interests of incoming settlers. What is perhaps even more to the purpose is the fact—and it is a fact—that the government takes a real interest in the settlers. The prosperity of the farmers is undoubtedly tied up with the prosperity of the province and *vice versa*. So much the better for the farmers, and so much the better for the newcomers, most of whom go on the land. This has been manifested in the recently-enacted legislation, whereby provision has been made for cash advances to settlers to enable them to prepare their land and equip it for early production.

The country is slightly undulating, occasionally hilly, and sometimes for considerable distances flat. The soil of the clay belt is in many places very similar to much of the soil of the prairies, but the forest growth and the thick covering of moss gives to much of the country a swampy appearance. It is not really swampy, however, as examination proves. It varies in texture, colour, character of admixtures, stratification, and chemical composition, but generally consists of a few inches of moss, then a considerable depth of mould—really decayed vegetation—then an underlying alluvial clay, extending to a great depth, the combination constituting splendid agricultural land. The lighter soil—largely a lime deposit—is a prime factor in the cultivation of grain, making as it does for stiffness of stalk and plumpness of head. In some parts of the belt, more or less draining will be necessary or advisable.

The areas known as muskegs, or moss barrens, which in some places are of considerable extent, are wet and sparsely timbered. The muskegs—generally supposed to have been shallow lakes originally—have become filled with decayed vegetation. When drained they are capable of producing most wonderful crops.

Through the belt generally is an abundance of good water. Wood for fuel is plentiful. All that a settler has to do is to cut it. Natural shelter is another consideration. The fierce winds and blizzards, not uncommon in some other parts, are unknown here.

The clay belt country has some of the best water-powers in the Dominion, and its almost inexhaustible supply of pulp-wood and good lumber warrant the establishment of many mills and factories which, in consequence of their employing much labour, will in due course create a valuable home market for the produce of the soil. It has every advantage in marketing its produce. In addition to the mining camps in the vicinity and the large pulp and paper mills, the important cities and towns of the country, as well as the seaboard, are easy of access. Ontario's eastern boundary is less than 50 miles from the port of Montreal, the gateway to Europe.

The town of Cochrane, which is the important point where the Temiskaming and Northern Ontario Railway joins the Transcontinental Railway, is in the same latitude as the south of Manitoba, the only difference in climate being caused by the different surface conditions. The dense forests of the clay belt hold the frost longer in the spring, but eventually by the removal of the forest cover, the soil will become drier; as settlement increases frosts will become rarer and crops more certain.

Game and fish are plentiful. A government license is necessary to shoot moose, which are abundant. Only one beast may be taken in the season, but as the average weight approximates eight hundred pounds, the settler is frequently enabled to lay in a stock of meat in the fall sufficient to last him throughout the winter. Pike, pickerel, and whitefish are most prolific; speckled trout are also found in some parts, notably in the Mattagami and its tributaries.

It will interest the farmer, and all who may have longings

for the free, untrammelled, and independent life of this new land, to know that it is not too heavily timbered. Here is spruce up to twenty inches in diameter, but averaging less than eight; balsam up to sixteen inches, but averaging six; poplar and balm of gilead up to two feet in diameter, but averaging thirteen inches. Tamarac runs about ten inches on the average, and white birch about seven inches. It can thus be readily seen that the tree growth is generally small. There are none of the huge white pine, maple, oak, elm, ash, beech, and hemlock, which, while valuable as timber, give the settler so much work to remove.

The cost of clearing varies, roughly, from \$6 to \$60 per acre—sometimes more—according to the nature of the soil, whether vegetable mould, sandy loam, or clay land, and again as to whether it is heavily timbered or has recently been burnt over by forest fires. Against this must be put the value of the pulp or timber sold, and such material as is used to build the home and for winter fuel.

White pine is always reserved on government lands, but in the area herein referred to spruce is the prevailing tree; it goes with the land and is a valuable asset to the settler. The Abitibi Power and Paper Company has established large pulp and paper mills at Iroquois Falls on the Abitibi River, in the eastern section of the belt, and is buying from the settlers over a wide area. After his field has been burned and cleared up, most of the stumps are easily removed by the farmer. In a couple of years there are none which a team of horses could not easily pull out—the roots do not extend to any great depth—leaving a good clear field without stumps or stones, and with soil equal to any in the country.

Grain-growing, stock-raising, dairying, and the cultivation of root crops, are each and all likely to produce good results; but mixed farming will always be safe farming, and, therefore, in the long run, certain to pay best. The country being well watered, forage crops grow luxuriantly. This northern section, therefore, is certain in time to become a great producer of meat and dairy products.

Here, then, is undoubtedly an opening not only for the man with capital, but also for the man with little capital except his physical strength, his intelligence, and a deter-

mination to succeed. Here he can secure for himself that independence possible only to those who have broad acres of their own and a home where, begotten of a reasonable measure of prosperity, contentment and happiness reign. Here is a harvest for his reaping. It is not, however, a land for the idle, for the slothful, for weak and spineless men. It is a promising land for the worker, but not for the speculator. Pioneer life, as in the olden days, demands the spirit of our forefathers. It demands a type that is willing, if necessary, to endure some privation and disadvantages.

“Life’s greatest art, learned through its hardest knocks,
Is to make stepping-stones of stumbling-blocks.”

The main attribute that makes for success—and generally achieves it—is a grim determination that the quality of one’s work, be it farming, manufacturing, or anything else, shall excel the standard hitherto looked upon as the best.

The day will assuredly come when settlers will pour into this country, not only farmers, but mechanics, clerks, and business men, and—to some extent—the overflow of the cities will here find a home. Since 1912 over half a million acres have been located for actual settlement purposes, and it is a fairly safe prophecy that another million acres will be located within two or three years of the declaration of peace.

MANITOBA AFTER THE WAR

BY THE HON. T. CRAWFORD NORRIS, M.P.P.*

Writing while this great war, which has convulsed the world, is only well entered upon its second stage, in which the opposing forces have reached an equality of strength, it is somewhat difficult to undertake to foretell the precise manner in which the war, and its consequences, will affect, or modify, the future development of Manitoba.

For the moment, the pre-occupation of Manitoba is with the struggle. She is putting forth efforts and making sacrifices, in order that the war may end in complete victory, on a scale which testifies eloquently to the devotion of her people to the great cause of humanity now being championed on the battlefields of Europe. Before the close of the war, at the present rate of enlistment, at least fifty thousand men from Manitoba will be in uniform doing their bit for Canada, the Empire, and civilization.

One of the greatest results of the war will, therefore, be that after making due allowance for those who will give up their lives for the flag, the community life of Manitoba will be vitalized and refreshed by the return of tens of thousands of men who have learned, in the fiery school of war, the duties of patriotism and the obligations of citizenship. It has been a just observation in the past that people have taken their duties to the state very lightly, making them subordinate to personal inclinations and material interests. The war has taught us all that we must live not only for ourselves, but for the community as well. We shall have, because of this war, higher standards of public life, a more enlightened and acute public opinion, a greater readiness on

*Tobias Crawford Norris: born 1861; elected Member of Legislature of Manitoba, 1896; defeated in 1903; elected again in 1907; appointed leader of the Opposition, 1910. Became Premier of Manitoba, 1915, on resignation of the Roblin Government; returned as leader of the Government, August, 1915, on appeal to the country.

the part of able men to serve the people, and a fiercer intolerance of political corruption and incapacity. The influences which will thus rectify and purify public conditions will operate, as well, in our business and social life. This is a gain which is to be placed very high. Manitoba, like other Canadian provinces, for many years to come, will be marked, on the part of the people, by plain living, hard work, and clear thinking.

In a material sense, the consequences of the war are not likely to be serious for Manitoba; indeed, in many respects, the discipline will be beneficial in turning the province into paths which will lead ultimately to great prosperity and happiness for her people. The basis for Manitoba's greatness must be production—the turning into wealth of the great resources now almost untouched. Manitoba, in common with the rest of western Canada, enjoyed, for some years, a prosperity which was not in reality as soundly based as it appeared. It was a prosperity arising from the importation of vast sums of money, which were employed in supplying the physical basis for the future commercial development, notably in the construction of railways, and the building of cities. Accompanying this, there was, inevitably, a great volume of speculation, much of it rank and unhealthy.

These conditions have utterly passed away, and will not recur, at least, within the lifetime of this generation. The process of adjustment was under way before the war; but with the shock to credit, following the outbreak of hostilities, western Canada was brought up sharply against the necessity of securing a new basis for business by the immediate enlargement of all possible agencies of production. The problem before the western provinces was to secure the money necessary to keep the wheels of commerce moving, not by large borrowings, but by taking advantage of their own home opportunities, many of which had been neglected. Despite difficulties in the way, owing to heavy charges for liabilities incurred in the past, lack of needed capital, and a growing shortage of labour, due to the increasing drain of the war, the producers of the west made a great advance towards economic independence by the success which attended their energetic efforts to increase the output of farm products during 1915.

The future tendencies of business and commerce in Manitoba can be inferred from the movements already under way. The province will set about the task of developing its resources by hard work, by intelligent planning, and by the hearty co-operation of all those agencies which make for improvement. There will be more farming, and better farming; there will be improved methods of marketing, largely co-operative in character; agriculture will become more diversified and more profitable. Rural prosperity will be recognized as the true basis for the commonwealth. To reach the objectives desired, there will be need for courage in re-casting existing methods, and discarding outworn theories. Our educational system, from common school to university, must efficiently serve the new order of things. One of the problems of the future is the widening and simplification of credit for the business of farming. Much of the new capital necessary for the remodelling of our agricultural systems can be obtained, it is hoped, in the country itself, if it can be rendered fluid and available by the creation of new loaning and banking agencies, at least partly co-operative in character. This is one of the urgent questions of the immediate future, and its settlement, on sound and national lines, is a necessary accompaniment to the new order of things foreshadowed.

Manitoba is not, of course, a purely agricultural province. The keeping pace with the growth of rural prosperity will match its manufacturing and industrial development. This province has enormous potential wealth in its water-powers, and very considerable natural resources in timber pulpwood. There is some reason to believe that the outlying, undeveloped portion of the province is a storehouse of precious minerals; but a systematic exploration and survey, preparatory to development, awaits the promised transfer of these resources by the Dominion to the province.

Manitoba faces the period of reconstruction, after the war, with hope and confidence. She will be able to absorb into the ranks of her workers, in farm, factory, and forest, all her returning soldiers, and, as well, to welcome, with an assurance of a reasonable degree of prosperity in return for honest labour, all suitable settlers who desire to make this province their home.

THE FUTURE OF SASKATCHEWAN

BY THE HON. W. R. MOTHERWELL, M.P.P.*

In order to approach such a wide subject in an intelligent manner, it is necessary in the first place to know something of Saskatchewan at the present time. Having thus made sure of our base, we shall be in a position, while avoiding anything of a speculative nature, to gather what may reasonably be expected of the province in the future. Our great industry is, and will continue to be, that of agriculture, and some idea of the importance of the province in this respect to-day may be gathered from the fact that we have rather more than half of the total wheat area of the whole Dominion placed to our credit. I do not know that I am particularly anxious, as Minister of Agriculture, to see this proportion increased. Wheat in the past, even in many precarious ripening districts, has been paramount, but this undesirable condition is gradually being replaced by more diversification, both in the growing of more live stock and more coarse grains.

Saskatchewan has reached a period in its development, other than agriculture, where we should to a great extent be justified in calling a halt. The province is established, there are three transcontinental railways crossing from east to west, there are cities, churches, a university, schools, elevators to handle our grain, in fact we have a plant, and the time and the necessity has arrived for us to produce sufficient to keep our plant working to its full capacity. Self-support as far as practicable is, or should be, our doctrine. We are endeavouring to educate our younger people with this idea in view. If the rural public school is operated in any degree to make boys and girls discontented with the farm or farm life, it is in that degree operating against the promotion of Saskatchewan's prim-

*William Richard Motherwell: born 1860; Past-Pres. Central Canada Seed Growers' Ass'n.; Founder, Grain Growers' Ass'n., Sask.; appointed Minister of Agriculture, Province of Saskatchewan, 1905.

ary and essential industry. Therefore, our rural school system can be counted as a useful and successful institution only in so far as it turns out boys and girls good citizens, the great majority of whom are fitted and willing to make agriculture their life work and to carry it on efficiently. Premier Scott recently made an important address forecasting the necessity of a thorough overhauling and reform of our rural school system, in which agriculture, both theoretical and practical, should be given more consideration in training the youth of our land. We are also endeavouring to reach the farmer and his wife. At the time of writing, two "better farming" trains are running in the southern part of the province. This has been made possible by the co-operation of the Canadian Pacific and the Canadian Northern Railways, the College of Agriculture, and the Department of Agriculture. We have also adopted a district representative system, and men trained in the agricultural colleges of Canada are now occupied the year round in helping the farmer to solve his individual problems. This system will be extended as means permit, and men suitable for the work are forthcoming. It will thus be seen that it is our earnest desire to secure our base; but there are other factors which must not be overlooked, as having a direct bearing on our economic future and the welfare of the people of the province.

What may be expected of Saskatchewan? Without a doubt the agricultural production of the province must be increased, and it will be necessary to encourage and assist agriculture rather than the dependent industries of the province or even those of the Dominion, which are merely based upon it. It is, of course, satisfactory to know that we have thousands upon thousands of acres of prairie land—yes, millions upon millions—still waiting the plough of the settler, but the problem of securing those settlers is only merely begun. Many predictions have been made as to the flow of immigrants to our land after the war is over, but if this flow is to swell and continue, then every burden and hindrance to pioneer agriculture, whether artificial or otherwise, must be removed and very reasonable assistance afforded. The settlers who are already here must first be enabled to make good, before the tide of immigration will flow, as it should.

WHEAT PRODUCTION.—If the arable acreage of Saskatchewan is placed at 60,000,000 acres, some analysis of the trend of agriculture is needed before we can begin to estimate the possible area that may be under wheat in any one year in the province. The experience of States to the south of us, which are similar in topography to Saskatchewan, seems to indicate that it would be unwise to use too high an estimate. During late years, Saskatchewan has been taking stock of its position, and the conclusion arrived at indicates that from now on more intensive methods should be adopted. This, naturally, suggests a permanent system of agriculture, in which live stock will play an important part. It is necessary, therefore, to take this and the acreage in fallow and coarse grains into consideration when estimating the area which may be sown to wheat in any one season, and on this basis, it would be unwise to count on more than one-third of the above acreage under crop in any one season being sown to wheat.

THE FUTURE POSSIBILITIES OF THE LIVE STOCK INDUSTRY

Horses.—Towards the latter part of 1914, the demand for horses suitable for cavalry and artillery purposes increased rapidly. The frightful slaughter of horses in the theatre of war will result in the countries of Continental Europe facing an acute shortage in farm horses both for work and breeding purposes. A good market is, therefore, assured to the province for some time to come.

Sheep.—It is considered that in Saskatchewan the coming industry in the stock portion will be sheep. The increase in production will come about by the increase of small flocks, rather than an increase in large flocks. It is estimated at present there are 177,750 sheep in the province, and there is no reason why there should not be an enormous increase in the next ten years.

Hogs.—The condition of the swine breeding industry at the present time cannot be said to be altogether pleasing or profitable to those interested, but nevertheless, this condition might be and has been, decidedly worse. There still remains vast scope for improvement in the commercial end of the industry, and a satisfactory means of disposal will have to be found before the swine industry will approach anything like a permanent nature. It is the intention of the government to

appoint a commission to enquire into the needs of the live stock industry, with a view to improving the conditions surrounding this most important branch of agriculture.

Cattle.—The old ranching days are over, but cattle will continue to play a very important part in farm economics. Indeed, considering the demand for beef cattle, it is regrettable that a shortage has occurred, not only in Canada, but in Great Britain and France also, at a most inopportune time. The figures in proof of this are as follows:—

One year's decrease in cattle: Canada, 9.3 per cent.; United States, 3.3 per cent.; Britain, 2.1 per cent.; France, 9 per cent. The figures for Canada are estimated at: 1913, 6,656,121; 1914, 6,036,817.

An increase in hogs is easy to obtain in a short period, but it takes at least four years for an appreciable increase in cattle as an outcome of a campaign for more live stock. It will be seen that good prices are assured for several years.

Dairying.—The future of successful dairying in any country very largely depends upon its early history and the wisdom behind the encouragement given to its development. A foundation well laid means permanency, prevention of waste in capital expenditure, the avoidance of discouraging features, and the continuation of one's work later on. Many lessons can be learned from the history of the older provinces as well as other countries, and in this respect a young province like Saskatchewan has a considerable advantage. Its government has tried to profit by those lessons and has consequently endeavoured to foster the industry by encouraging creamery organization, where success was practically assured, and discouraging it where the prospects appeared doubtful, preferring to have the work postponed for a few years rather than to have it undertaken prematurely, thus inviting failure.

Assurance can be given, based upon the past few years' marked progress, of the wisdom of an investment in dairy farming. Markets are always available, provided the quality of the produce is in keeping with the wishes of the consumer. To safeguard this we have instituted the policy of grading butter, and issuing an official grade certificate for everything examined by the official grader.

In the foregoing I have dealt with the affairs of the pro-

vince from an agricultural and general standpoint. The field to cover is wide—as agriculture progresses, so industries will follow in its wake. If Saskatchewan continues to hold its pardonably proud record for sound progress, taking advantage of lessons gained by experience elsewhere, I do not hesitate to predict that the future of the province will indeed be bright. Our arable lands are so enormous in extent; our fisheries, timber, mines, and grazing areas so vast in area, that it is quite within the mark to estimate that Saskatchewan can support, and support comfortably, a population equal to the present entire population of Canada.

ALBERTA'S FUTURE

BY THE HON. ARTHUR L. SIFTON, LL.D., K.C., M.P.P.*

The people of Alberta regard the brief period of its past with satisfaction, but look forward to its future with unhesitating confidence. The vast extent of its natural wealth, and the thrift and intelligence of its people are the factors that shall determine its industrial, commercial, and social history.

It does not require the gifts of inspired vision to foresee that an immense tract of territory like the province of Alberta, possessing the largest area of fertile and tillable land in the Dominion of Canada, and millions of acres of luxuriant grasses, capable of sustaining many times the number of cattle, horses, and sheep that are in the province at the present time, is destined to become a great producer. When we consider that, garnered beneath the plains, and wrapped in the folds of the foothills and the Rocky Mountains, there are actually billions of tons of coal, deposited providentially for the benefit and service of the inhabitants who shall fill the prairies of western Canada, and that as a result of commercial enterprise and scientific investigation into the chemistry of coal and other carbonaceous minerals associated with it, many new industries may be established, we are justified in the view that it is within the range of near probability that Alberta will engage in new forms of industrial production that exert a beneficial influence upon its economic and commercial future. Within the forest reserves there are supplies of timber, which, if properly conserved, can supply the common needs of the farmer, mine-operator, and builder for many years.

Upon these facts it can be predicted with certainty, if not with precision, that a great era of material expansion is

* Arthur Lewis Sifton was born 1858; B.A., 1880; M.A., and LL.D., 1888; Q.C., 1892; Chief Justice North-West Territories, 1903-5; Chief Justice of Alberta, 1905-10; subsequently Premier of Alberta.

bound to follow as the population of the province increases from year to year, as it undoubtedly will, for Alberta offers those opportunities which appeal most strongly to persons of moderate capital and independent spirit, who desire to improve their fortunes in a new country. Wherever there is good land, and healthful, temperate climate, there will be population. If Alberta had no other source of wealth except its fertile acres, it would still be able to sustain a teeming population, producing enough to supply its own wants, leaving a large surplus for exchange abroad to repay its borrowed capital, and to purchase those commodities which cannot be produced at home.

Though Alberta is a young province, it may be pointed out that already two distinct periods mark its history. From 1880 to 1900, Alberta was known to the outside world by the picturesque title of the "Cattle King and the Cowboy." With the turn of the century came the great migration of the American farmer, and the range was rapidly transformed into wheat ranches. To-day the range is closed, and exclusive grain production is vanishing. From this period onward the trend of development must be to co-ordinate agriculture and animal husbandry as the basis of financial stability and permanent prosperity. Notwithstanding the wealth of its mines and forests, the hope of Alberta lies in converting the riches of its soil, and in preparing for the markets of the world the highly specialized and concentrated products of the dairy.

During the last ten years a great deal of successful work has been undertaken by the government to promote this desirable end. Expenditures have also been incurred to construct roads, telephones, and railways in order that the people may have adequate facilities for the despatch of business and the conduct of trade. In a few years, at the present rate of improvement, Alberta will be as amply provided with these facilities as any of the older provinces, and conditions of life will be as favourable and conducive to success and happiness as anywhere in the Dominion.

MAKING THE DESERT BLOOM

THE WONDERS OF IRRIGATION

By J. S. DENNIS, C.E., D.T.S.*

To the large majority of the people of Canada the question of irrigation is entirely new and novel, and the results obtainable, through assisting agriculture by the artificial application of water, are little understood and poorly appreciated.

This condition is readily understood when it is remembered that in the eastern or older provinces of the Dominion, the climatic conditions are such that it has not been necessary to augment the rainfall by the artificial application of water; in fact, the energies of the agricultural population in portions of that part of the Dominion have been devoted to the construction of drains and ditches necessary to run off the surplus water, rather than to the bringing of it to the cultivated land, and legislation regarding water has been in the form of drainage acts, and matters connected therewith.

Through the purchase, in 1870, of the rights of the Hudson's Bay Company to that portion of British North America, then known as Rupert's Land, the Dominion of Canada became possessed of a vast territory, offering great variety of topographical and climatic conditions. It is with the portion of these territories, which experience has since proved requires irrigation, that this article more particularly deals.

The rapid settlement which followed the opening up of the newly-acquired territory was for some years confined to the more easterly portion, which, in 1870, became known as

* John Staunton Dennis was born in 1856; C.E., D.T.S., past vice-president, Canadian Society Civil Engineers; Inspector Surveys, Dominion Government, 1887-1896; chief engineer, Territorial Government, and subsequently Deputy Minister Public Works, 1896-1902; entered Canadian Pacific Railway, 1903; vice-president, Esquimaux and Nanaimo Railway, 1905; president, Irrigation Convention, 1908; president, Canadian Pacific Irrigation Colonization Company; assistant to the president, Canadian Pacific Railway Company. "Probably one of the best-posted irrigation expert engineers on the American continent."

the Province of Manitoba. There the rainfall, during the majority of years, was found sufficient to ensure bountiful crops.

When the construction of the Canadian Pacific Railway was, in 1882 and 1883, pushed west across the plains, or open portion of the territory, settlement followed close upon its heels. By the time the railway line had reached the Rocky Mountains, numerous settlements had been established along the route.

In 1882, the territories lying west and north of the Province of Manitoba were created provisional districts, called Assiniboia, Alberta, Saskatchewan, and Athabasca. The first-named district lay immediately to the west of Manitoba, and Alberta comprised the portion of the territories lying west of Assiniboia, and extended to the Rocky Mountains; both of these districts were traversed by the newly-constructed railway line. In 1905, the Provinces of Saskatchewan and Alberta were created, comprising the areas previously contained in the provisional districts of Assiniboia and Alberta.

The settlement which followed the construction of the Canadian Pacific Railway was divided into two classes; that in the eastern portion of Saskatchewan was mainly composed of farmers proper, who were engaged in the growth of cereals, while the more westerly settlements in western Saskatchewan and southern Alberta, were devoted to stock-raising. For some years stock-raising was the chief occupation of the population in the last-mentioned districts, but, by degrees, small amounts of cultivation were undertaken, and the growth of cereals attempted. In 1884, this portion of the country was blessed with a very bountiful rainfall, and the necessity for irrigation did not present itself. Although the two succeeding years were dry, the swamps and streams retained so much of the excessive moisture of 1884 that the residents were not aroused to the necessity for the artificial application of water; in fact, as they had largely come from the humid portions of the Dominion, or from Great Britain, they were unacquainted with the principles of irrigation, or the results to be accomplished thereby. The possibility of assisting the growth of crops by this means was realized only after continued seasons of drought, and after seeing the results

obtained by the construction of a few small irrigation systems by settlers who had come from countries where irrigation was practised.

The meteorological data regarding this portion of western Canada, obtainable at that time, was very vague and fragmentary; the government meteorological stations had only just been established, and the observations, which had been made by surveyors, explorers, or other transient visitors, were of too disconnected a character, and covered too short an interval, to be of use as a guide to the existing conditions. The settlers, therefore, fondly hoped that the dry seasons were exceptional, and confidently looked for a return of the conditions which had prevailed in 1884; but the ever-recurring dry years at last convinced the most skeptical that they lived in a semi-arid region, and that to irrigation alone they must look for the means of making a livelihood.

The meteorological data now available, and the topographical and general information which we have, enables us to designate, with a fair degree of accuracy, the limits of the semi-arid portions of Saskatchewan and Alberta. As an introduction to the general question of the attempt to reclaim the lands therein, by the means of irrigation, the semi-arid portion is described somewhat in detail.

SEMI-ARID REGION. The portion of the western provinces of Canada, exclusive of southern British Columbia, which may be said to lie within the semi-arid region, may be described as follows:—It is bounded on the south by the international boundary, on the east and north by a line commencing at the intersection of the 102nd degree of west longitude, with the international boundary, and running from thence north-westerly to latitude 51 degrees, 30 minutes, and thence west to the Rocky Mountains, and on the west by the Rocky Mountains. This portion of western Canada contains about 60,000 square miles, or upwards of 50,000,000 acres.

There is a portion of the western provinces lying to the east of the semi-arid region, as above described, and embracing a belt country extending into south-western Manitoba, which may be designated as the sub-humid region, where there is sufficient rainfall to warrant the planting of crops, and where agriculture, during most seasons, is successful, but where dry

seasons are experienced every few years, and the crops are cut off, owing to insufficient rainfall. In this region irrigation could beneficially be practised, to counteract the baneful results of these dry seasons, but, unfortunately, the available water supply is very limited.

The eastern portion of the semi-arid region lying between its eastern limit and the Missouri Côteau is largely a level plain, broken by some hills, as we approach the Côteau, and by the valleys of the Souris River and Moose Jaw Creek, the Qu'Appelle River, and Last Mountain Lake. After ascending the Côteau, the country is a high, open plateau, gradually rising towards the west, the elevation of the easterly portion being about 1,600 feet above sea-level, and of the most westerly, adjoining the foothills of the Rocky Mountains, about 3,500 feet above the sea.

This vast open plain is broken along its southern boundary as we proceed west, first, by the Wood Mountains, and then by the Cypress Hills, both of which cover a considerable area, and rise to a good elevation above the surrounding country. They are, in parts, wooded. As we approach the western limit of the region, the country becomes more or less rough and broken, in places, by the foothills.

SOIL. The soil of the semi-arid region is, as a whole, of an exceptionally fertile character. In places, sandy tracts and districts broken by sandhills and gravelly ridges are met, but in general the soil consists of a rich alluvial loam, varying in depth, and overlying a subsoil of clay and gravel.

In the Wood Mountains and Cypress Hills districts the country is more or less broken by ravines, and heavily timbered in places, but the soil is good, and the native grasses are both luxuriant in growth and nutritive in character.

In the valleys, along the streams, the bottom lands are of the richest kind, consisting of a heavy black loam of great depth. The vegetation in the eastern and central portions is sparse in places, but as we approach the western limit the native grasses become thick and luxuriant, and the soil has justly given south-western Saskatchewan, southern Alberta, and the valleys of southern British Columbia a reputation for exceptional crop production, when there is sufficient moisture.

WATER SUPPLY. The extension or permanence of irrigation in any country, where the artificial application of water for the growth of crops is necessary, is entirely dependent upon the available water supply. In practically all countries where irrigation is practised, there is a greater area of land available and suitable for irrigation than there is water which can be diverted for that purpose.

In the valleys of southern British Columbia, where, without irrigation, agriculture or horticulture would be impossible, nature has provided a bountiful water supply in the streams heading in the different mountain ranges adjacent to these valleys, and by conservation of this supply, through the construction of reservoirs, the available water supply will ultimately be utilized to its fullest extent. In southern Alberta, nature has also been good in supplying the short-coming of insufficient rainfall by providing many streams, such as the Bow River, High River, Old Man's River, Belly River, and the St. Mary's River. These are fed by the melting snow from the mountain ranges, and supply a large volume of water, which can be diverted for the irrigation of the wide areas of good land lying along these streams adjacent to the foothills, and further east. In south-western Saskatchewan, the only available water supply is that provided by the small streams heading in the Cypress Hills, and this supply is somewhat limited and precarious in character. However, it can be materially extended by the construction of reservoirs within the hills, and this, no doubt, will ultimately be carried out, so as to provide the large areas of good land available with the necessary water supply.

LAW RELATING TO THE USE OF WATER FOR IRRIGATION. In the Province of British Columbia, the earliest law relating to the diversion of water from its natural channel dealt with its use for mining, but as irrigation was introduced and extended, it became necessary to amend and extend this law to cover this latter use. Finally, within the last few years a very comprehensive enactment was passed, under the provisions of which the acquirement and the use of water, so as to provide permanence of title, have been amply provided for.

In the Provinces of Saskatchewan and Alberta, the use of water for irrigation is provided for in an Act of the Domin-

ion Parliament, first passed in 1894, and since amended and extended, and now known as "The Irrigation Act". This law is most comprehensive in its character, and contains clear-cut provisions, under which the title to water for irrigation can be acquired and attached to the land.

In all countries where it is necessary to divert water from its natural source or channel for the purpose of irrigating land, it is of first importance that this should be possible, under the provisions of a law which will grant the same title to water as to land. The fact in all countries, already stated—that there is a larger area of land available and suitable for irrigation than there is water with which to irrigate it—indicates that the value is in the water, not in the land, and, as a consequence it is of first importance that the law relating to the use of water should be comprehensive in its provisions and final as to titles acquired thereunder.

In western Canada, fortunately, the introduction of irrigation was followed, in its early stages, by the enactment of comprehensive laws relating to the use of water for this purpose. As a consequence there has been an absence of litigation on this subject, such as, unfortunately, has followed the introduction of irrigation in other countries where the laws relating thereto were faulty in their provisions.

IRRIGATION DEVELOPMENT. In British Columbia, the most westerly province of the Dominion, the early settlement and cultivation of the valleys in the interior proved the necessity for the application of water, through irrigation, to make agriculture successful, and for many years the principle has been in active operation there, notably in the Kamloops and Okanagan districts. The experience which has come to the early residents of that province, through the construction of ditches and flumes for the conveyance of water to aid mining operations, proved of value when systems carrying water for irrigation were undertaken, and in some instances the works originally constructed for the first-mentioned purpose are now utilized for the latter. In several portions of the southern districts of the province, extensive and modern irrigation systems have now been constructed to provide water for large areas of land, and very satisfactory results have been obtained, particularly in the production of fruit and fodder crops.

In southern Alberta, the introduction of irrigation dates from the construction by Mr. John Glen, in 1879, of a small ditch taking water from Fish Creek, about eight miles south of the present city of Calgary. Following his experiment, many of the early settlers in the valleys along the streams before mentioned in southern Alberta, and in the Cypress Hills district in south-western Saskatchewan, located and constructed ditches to irrigate their meadow lands. These small, individual systems have since increased, until, at present there are some 339 in operation, designed to supply water for about 108,266 acres.

In southern Alberta, the first large irrigation system was that constructed by the Alberta Railway & Irrigation Company, whose canal system heads in the St. Mary's River, south of the city of Lethbridge and not far from the international boundary. This system is complete, and is designed to supply water for the irrigation of some 125,000 acres.

The next large irrigation system undertaken was that of the Canadian Pacific Railway Company, the canals of which take water from the Bow River, east of the city of Calgary. This system, which is now complete, is designed to supply water for the irrigation of some 750,000 acres, and comprises something over 5,000 miles of completed canals and distributing ditches.

The third large system undertaken in southern Alberta—and which is now under construction—was that of the Southern Alberta Land Company, which also obtains its water supply from the Bow River, and is intended ultimately to supply water for the irrigation of 150,000 acres, lying south of the stream from which the water supply is received.

Completed irrigation canals and distributing ditches in southern British Columbia, southern Alberta, and south-western Saskatchewan comprise a total length of at least 10,000 miles, and up to date there has been expended on these irrigation systems, including those constructed for individual use, a sum of not less than \$30,000,000.

RESULTS FROM IRRIGATION. Irrigation is, after all, nothing more or less than insurance on crop production. The great famines of the world that have resulted from crop failure, and the crop failures which have not been followed by famine,

have resulted, not from poor soil, poor seed, poor cultivation, or want of sufficient heat, but from insufficient rainfall.

Irrigation is known to be one of the earliest agricultural pursuits of mankind. Menes, the first of the Pharaohs, developed the practice in Egypt thousands of years B.C. It reached a high degree of perfection in South America away back in immemorial times, and has flourished practically throughout the world to the present day. Irrigation agriculture is, after all, the method of crop production of which we have the earliest record in history, and there is practically no country in the world where it cannot be followed to advantage. This will be noted from the fact that it is practised in countries that have a rainfall in excess of 60 inches per annum. It is a peculiar fact that history records no instance of any large emigration from the irrigated portion of any country, and it is also a matter of recorded fact that the practice of irrigation results in intensive cultivation of the soil and a wide range of soil production, which is not possible, where either agriculture or horticulture are dependent entirely upon the natural rainfall.

The introduction of irrigation into western Canada is of too recent a date to justify any prophecy as to what the final results will be, but we do know that without it large areas in all the districts above referred to would remain unsettled and undeveloped if ordinary farming methods had to be resorted to, and, further, by the introduction of irrigation in southern British Columbia, fruit culture has now reached extensive proportions. In southern Alberta and south-western Saskatchewan its introduction has resulted in increased crop production, as will be indicated from the following official statements, and also in the growth of fodder crops, which cannot be produced without the artificial application of water. The experience so far gained, certainly justifies the statement that the expenditure of the large sum of money referred to in the construction of irrigation systems will, in time, result in making the irrigated districts of southern British Columbia, southern Alberta, and south-western Saskatchewan, the most closely settled, intensively cultivated, and uniformly successful agricultural and horticultural districts in the Dominion.

Results from Irrigation at the Dominion Government Experimental Farm, Lethbridge, Southern Alberta

	Irrigated Bus. per acre 7-year average	Non-irrigated Bus. per acre 7-year average
Wheat, Red Fyfe	46	26
Oats, Banner	101	59
Barley	73	34
Potatoes	492	233

Results from Irrigation at the Dominion Government Experimental Station, Strathmore, Alberta

	Irrigated Bus. per acre 7-year average	Non-irrigated Bus. per acre 7-year average
Wheat, Red Fyfe	43	16
Wheat, Marquis	50	17
Potatoes	353	257
Peas, Golden Vine	34	21
Peas, Prussian Blue	40	27

THE ALPS OF THE NEW WORLD

PLEASURES OF CLIMBING THE CANADIAN ROCKIES

BY ARTHUR O. WHEELER, A.C., F.R.G.S.*

"For it's there that one can rest, lying close to Nature's breast,
And the breeze's lullaby is low and sweet.
So I lift my longing eyes, where the stately mountains rise,
And the wooded hills are nestling at their feet."

—Marion L. Moodie.

The driving of the last spike of the Canadian Pacific Railway at Craigellachie on the 7th November, 1885, opened up to the world at large for recreation purposes, the glorious mountain scenery and revitalizing atmosphere of the Canadian Rockies, and laid the foundation of a revenue to the country in the future, the possibilities of which cannot even be estimated, they are so great.

At the time the railway was located the object in view was to obtain the best possible alignment for the road. Instead, had the principal object been to open up a scenic centre and world's recreation ground, no better location could have been selected. As the line now stands in its location through the Kicking Horse Pass in the Main Range, the Rogers Pass in the Selkirks, the Eagle Pass in the Gold Range and along the valleys of the Thompson and Fraser Rivers, no more spectacular and overpoweringly impressive scenic route could have been chosen. In each instance there is a climax of mountain

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scenery in varying types of cloud-encircled peaks reaching far into bright blue sky, of shining snowfields and crystal icefalls, of rushing torrents foaming through the tremendous depths of deep-cut gorges. In places these awe-inspiring canyons are so narrow that "the river and the railway dispute a passage."

Miles on miles of shining river and scintillating lakes are traversed, lakes of wondrous shades of blue; waterfalls leap from high-hung glaciers; rockfalls and snow avalanches strew the path. Through the Selkirks long stretches of ponderous shedding guard against the snowfalls. Even as I write, a tunnel, five miles in length, is being constructed through the heart of Mt. Macdonald at the summit of Rogers Pass, in order to avoid dangers caused by such forces of Nature. The tunnel is a triumph of engineering skill and, at the summit of the range, is 6,000 feet below the crest of the mountain.

The fame of the Rockies and the Selkirks quickly became known, and European and other travel began to set back and forth over the transcontinental highway, and word went abroad of the hidden beauties and attractions of a land that for an immensity of time had been a *terra incognita*.

It is my intention to sketch very briefly the progress and development of this unknown country into a Mecca for mountain climbers, nature lovers, and the ordinary, every-day tourist; for so vast a subject there is not space here for more than an outline.

A question that is often asked is, "How do the Canadian Rockies compare with the European Alps?" There is no comparison. It is impossible to compare any two separate ranges of mountains, or even any two separate parts of a range. Each has its own distinctive features. In the European Alps the human element is very much in the foreground; towns, villages, chateaus, and chalets are everywhere; teeming life, inhabitants, and tourists, are on all sides; mules, cattle, sheep, and goats fill the mountain meadows; over all are the towering mountains and the snow and ice. In the Rockies, on the other hand, civilization is chiefly remarkable by its absence; wild solitudes, Nature in all her nakedness is the key-note, and one may travel for days or weeks without meeting a soul. Tourists are few as compared with the vastness of the areas, and, except at the summer hotel centres of the

Canadian Pacific Railway and at the widely scattered towns and villages, life is sparse. It is the contrast of the old with the new, and conditions for many reasons can never be the same as those in Europe.

Prior to the advent of the railway the Rockies were an unknown land. Gradually, centres of great beauty were discovered: Banff, Lake Louise, Moraine Lake, Lake O'Hara, Emerald Lake, The Yoho Valleys, Mt. Assiniboine, Ice River Valley, and the Upper Bow Valley in the Main Range, and Rogers Pass, The Asalkan Valley, Mt. Sir Sandford, Mt. Dawson, the Bishop's Range, and Cougar Valley in the Selkirks, while in the Purcell Range of late years still another field of wide area and surpassing attractions has been opened up.

All these beauty spots, and many others not mentioned, contain features of very deep interest that provide a magnificent scope for scientific studies in geology, glaciology, botany, and natural history, and for artistic and literary tastes with the brush, the pen, and the camera.

Owing to a heavy winter precipitation the snowfall is abundant, having a yearly average of thirty-five feet at the summit of the Selkirks, where a snowfall for the winter of as much as fifty feet has been recorded. Wide snowfields lie in basins between the peaks, sometimes of great extent; the great Columbia Snowfield, for instance, is said to contain an area of 200 square miles, and the Wapta Snowfield is known to extend over twenty-five square miles of surface.

This continual accumulation of snow, from year to year, overflows in wildly broken icefalls, which, in the Selkirks, flow well down into the green timber. Hanging and cliff glaciers are seen high up on the sides of the mountains, adding much to their picturesque appearance and contrast of colouring.

On the larger glaciers, crevasses, séracs, mouline, glacier-tables, sand-cones, and moraines give endless study to the student, and the glaciers themselves are of many and varied types.

Immense waterfalls, such as the Takakkaw, the Twin Falls, Amiskwi Falls, Kicking-Horse Falls, Emperor Falls and many others, are of world-wide fame.

The Canadian Rockies are supreme in the number and beauty of their mountain tarns. In variety of colours and in

appearance they resemble rare jewels set in a soft velvet of forest green. At early morn and late eve they are mirrors, reflecting on their placid surfaces the wonderful mountain uplifts that are all about them, and when the breezes blow their tiny wavelets flash and sparkle like myriads of diamonds. They are of many different shades—emerald green, turquoise blue, sapphire blue, cerulean blue, jade, indigo—and I have even seen a bright chrome yellow. The varied colouring is due to rays of light reflecting through the very finely powdered silt washed into them by glacial torrents and held in suspension in their waters.

Most remarkable, also, especially in the soft limestones and sandstones of the Main Range, are the grotesque shapes into which the cathedral-like masses of the peaks have been carved during the building up of their architecture—towers, spurs, *gendarmes*, *aiguilles*, and groups of isolated pillars known locally as *hoodoos*, in some cases each pillar surmounted by a flat slab of rock, in others of a purely conglomerate formation. Near Glacier Station, in the Selkirks, are wonderful subterranean caves, extending far into the bowels of the earth, that have been hollowed out, through the course of centuries, in a bed of crystalline limestone, the result of seismic disturbance and continual water erosion. Similar, but less well known, features have been found in other places.

By no means least attractive are the high, open, grassy meadows, known as alplands, where the Rocky Mountain goat (*Haplocerus Montainus*) and the Bighorn (*Ovis Montana*), graze, for the most part, undisturbed; where the Hoary Marmot, or Whistler (*Arctomys Columbianus*) sends forth his resounding note from crag to crag; where the tiny Pika, or Little Chief Hare, (*Lagomys Princeps*), commonly known as "the haymaker," collects his little harvest for winter store, and the raucous cackle of the many-colored ptarmigan—pure white in winter—sounds as they flit from rock to rock. Here, also, caribou, elk, and other varieties of deer are seen. These meadows are aglow with alpine flowers of great brilliancy and striking variety.

Apart from the many and varied features of scenic interest the climatic conditions create most attractive results. The bright blue skies and bright sunshine of the Rockies are a joy.

The heavy winter snows, in conjunction with the early summer sunshine, produce most wonderful cloud effects. Great billows of fleecy cumulus clouds drape the higher summits. Clouds spring from nowhere. The sky may be absolutely clear, when a cloud will slowly form around a mountain summit and hang there in an aureole all day; again, long streamers and wisps reach out from the summit like smoke, giving a peak the aspect of an active volcano. I have often heard the Swiss guides say when this occurs on Mt. Sir Donald, "Ole Sir Donnel, he smoke him pipe."

The Spectre of the Brocken, usually supposed to belong to the Harz Mountains, is sometimes seen in the Rockies, when conditions are favourable. I have seen it three times and heard of it several more. Rainbows are wonderful and varied in their intensity. The most wonderful I have seen was very nearly a complete double circle, all but a tiny bit at the bottom, where the shadow of a rock precipice cut off the sun. The double circles were caused by the rainbow proper and its reflection; both were very vivid. In the centre, as in a many-coloured frame, arose the black, isolated silhouette of a majestic peak.

Snowfalls produce most picturesque effects. On the highest peaks, where the action of wind, sun, and frost is unchecked, most wonderful configurations are seen—branches, sprays, and pendants—and the cliffs, precipices, and cornices are lined and set with icy teeth. In the woods enormous aggregations gather round the tops of stumps of trees that have been cut; they are known as snow-mushrooms, which they greatly resemble. Huge snow-fungi are seen on the tree-trunks, and the branches are so loaded with snow that the forest appears an unknown white world of enchantment.

Popular demand soon called for the establishment of accommodation for travellers who wished to see all these wonders, and in response to it the Canadian Pacific Railway built small chalets at several of the most accessible beauty spots. These chalets have been expanded, owing to increasing call, until the present palatial hotels at Banff, Lake Louise, Field, and Glacier have come into existence.

While these are all that could be desired in the matter of comfort and luxury, it will be confessed by mountain habitués

that the delightful little chalets of the earlier days were more attractive to the lover of Nature, when groups of devotees gathered informally of an evening—after a hard day among the peaks, the snow, and the ice—over a cosy fire of aromatic pine logs, and spun yarns of their prowess, yarns that lost nothing in the telling.

Mrs. Young presides at Glacier House. It is the only establishment of the series where the old traditions survive and are held sacred. This charming lady's keen sense of humour provides many an entertaining evening with stories of eccentric guests; for instance, of the lady who hired a pony and rode through the woods to see the great glacier of the Selkirks, a broken mass of tumbling ice falling five thousand feet from the snowfield in which it has its source and towering high above the hostelry. She gazed at it in silence for a spell, then rode back to the hotel and asked Mrs. Young in all seriousness, "Is it a real glacier or one that had been put there by the C. P. R. for an advertisement." Again, of the gentleman who, when shown to his room, came back to the office in a towering rage and declared in belligerent tones, "I cannot sleep in that room, the bed is not right." "Why," said Mrs. Young, "what is the matter with it? It is one of the best rooms in the house." He then exclaimed with wrath, "The bed is in the wrong direction. I cannot sleep unless my bed is set in the magnetic meridian." When assured that he might shift his bed to any direction he pleased, even to putting it out of the window, he beamed and said, "Oh, may I!" and ever since has been one of Mrs. Young's warmest admirers.

During the summer of 1883—two years before the completion of the C. P. R.—the late Sir Sandford Fleming, chief Government Engineer, and one of the directors of the railway company, made a tour of inspection over the located line of the road. Arrived at the summit of the Selkirks, the party, while resting from their journey which was made on horseback, was inspired by the wonderful mountain surroundings, and proceeded, as a matter of diversion, to organize an Alpine club for Canada. Upon a grassy knoll in the midst of the very climax of Selkirk scenery, the meeting was held. Around, in full view, was all that makes alpine climbing of interest; the rugged black precipices of Mts. Macdonald and Tupper; the

primeval forests rising to grassy slopes decked with brilliant flowers; icy glaciers and fields of pure white snow; close by gently swaying spruce trees; at their feet a murmuring brook, the whole over-shadowed by the towering heights of Syndicate Peak, now known as Mt. Sir Donald. All tended to etherealize the moment, and there the idea of forming an alpine club was conceived.

Sir Sandford was elected president, the late Principal Grant secretary, and Mr. S. H. Fleming (Sir Sandford's son) treasurer. It was the play of a passing impression wrought by the marvel of the surroundings, and yet that moment had a very considerable effect upon the subsequent realization of a real alpine club for Canada, of which Sir Sandford Fleming was the honorary president from its organization in 1906 until his death in 1915.

In 1885, Professor John Macoun, Dominion Botanist, and his son were camped at the summit of Rogers Pass awaiting the completion of the railway. They then made an ascent on Mt. Avalanche.

During the summers of 1883-4-5, the late Dr. George M. Dawson, Assistant Director, subsequently Director, of the Geological Survey of Canada, made surveys covering the Main Range, south of Lat. 52° and north of the International Boundary. His resultant map, published in 1886, was a wonder, and the information it contained has been little changed by later and more elaborate surveys.

In 1886 climbs were recorded by J. J. McArthur, the veteran topographer of the Department of the Interior, who, while conducting topographical surveys in the Selkirks, made ascents on Mt. Tupper and Mt. Cheops, and in the same year accompanied by O. J. Klotz, of Mt. Mackenzie, close by Revelstoke.

The following year McArthur made the first ascent of Mt. Stephen, in the Kicking Horse Pass, close by Field, the most spectacular climb that had yet been made. His second ascent in 1892 furnished a great surprise, when it was found that fully 200,000 cubic feet of rock had been displaced near the top of the mountain and had fallen into the amphitheatre below, making the climb one of much greater difficulty.

In this year, also, George and W. S. Vaux and Miss Mary M.

Vaux, of Philadelphia, visited the Selkirks and put up at a small chalet built by the railway company where Glacier House now stands. They then commenced their observations and measurements to ascertain the rate of flow and the advance or recession of the Illecillewaet Glacier, commonly spoken of as the "Great Glacier of the Selkirks." Although by no means the largest, its spectacular appearance, falling 5,000 feet from sky-line in a stupendous cascade of ice, seamed and studded in every direction by crevasses and séracs, and apparently burying its nose in the forest of fir that surrounds its base, lends it a value that, seen from the station platform, renders it one of the most impressive sights of the entire region. From the hotel and station it is one and a half miles distant, and is reached by a bridle path through an ancient forest traversed by immense rock moraines and filled with a tropical growth of devils club, huckleberries, giant ferns, and mixed undergrowth. The observations of the Vauxs have been carried on for many years, and their publications illustrated by Miss Vaux's beautiful photographs, have given very valuable records to the public.

In 1888, the Rev. W. Spotswood Green, an old Swiss mountaineer, author of "The High Alps of New Zealand," made his appearance in the Selkirks, accompanied by the Rev. Henry Swanzy. They spent a summer mapping the district, and Mr. Green's resultant book, "Among the Selkirk Glaciers," published in 1891, has become a classic. His map was the first made of the region around Glacier. Mr. Green, an Irishman of somewhat melancholy expression, but with a delightful twinkle in his eye, has added to his tale a fund of humour and anecdote that makes the story of his explorations and ascents most fascinating reading. At Donald, a divisional point of the railway, situated at the north-eastern face of the Selkirks, he discovered a mighty hunter, who expressed a desire to join him in his explorations, and accepted his terms for such service; but, when he heard that he was going with two parsons, he "chucked it up" in disgust, saying that he would have to knock off swearing for over a month, and that was utterly impossible!

The great monolith, 10,808 feet in altitude above sea level, towers over the C. P. R. Hotel at Glacier in a sharp, clear-

cut pyramid; to its right, from the station platform, the great icefall is seen, rising above a dark-green forest. It is a superb picture, and holds the travelling public spell-bound with wonder for the few minutes the trains stop at the station.

In 1890 Carl Sulzer, of the Swiss Alpine Club, made the first ascent of Swiss Peak, 10,515 feet. He had reached the summit and was busy sketching when he noticed that black thunder clouds were rapidly approaching the peak. Suddenly two stone slabs next to him began to make a humming noise, the metal holder of his pencil began to buzz, and his ice pick to crackle. He was in an electric cloud and experienced a peculiar phenomenon that is frequently experienced by mountain climbers, when one's whole body tingles with an electric charge and one's hair stands straight up on end. In subsequent years Mt. Sir Donald became the stock climb from Glacier House, and a number of ascents were made yearly.

It was in 1890, also, that Professor Chas. E. Fay, as a representative of the Appalachian Mountain Club of Boston, made his appearance at Glacier. Professor Fay, for many years president of the club, was a most ardent and successful mountain climber, with a wide experience in Switzerland and elsewhere. He was so impressed with what he saw of the Selkirks, that he became one of the most enthusiastic exponents of the Canadian Rockies, making many of the principal first ascents; among these may be specially mentioned Mt. Dawson, 11,113 feet, made in conjunction with Professor Parker of Columbia University, in 1899; Mt. Goodsir (south tower), 11,676 feet, again in conjunction with Professor Parker in 1903; Mt. Lefroy, 11,220 feet, with Parker and others in 1897; Mt. Hector, 11,125 feet, with Abbot and Thompson in 1895, and Mt. Vaux, 10,881 feet, with Outram and Scattergood, in 1901. Than Professor Fay, no man has done more to exploit the Canadian Rockies, and Canada owes him a deep debt of gratitude for the very thorough manner—to him a work of love—in which he has brought their beauties and many other attractions to the notice of the world.

Professor Fay's visit was followed by the advent of other members of the Appalachian Mountain Club of Boston, and from 1893 on, yearly visits were paid to both the Main and Selkirk Ranges.

The year 1893 also recorded the presence of Professor S. E. S. Allen and W. D. Wilcox. Wilcox's book, "The Rockies of Canada," published in three editions, sets forth in charmingly descriptive language a very lengthy series of explorations, beginning with the year named, and extending from Mt. Assiniboine, south of Banff, on the C. P. R., to the Athabaska Pass, near the G. T. P. Railway, a distance of nearly 200 miles as the crow flies. His book is illustrated with photographs, which stand out unique in artistic effect and picturesque composition.

Mr. Allen's explorations south of the Kicking Horse Pass are remarkable, and he did much to unravel the tangled topographical problems of the region. Many names given by him have been handed down in the history of the mountains. Accounts of his explorations are to be found in the records of the *Alpine Journal*.

Up to the year 1896 no fatal accident had resulted from mountaineering in the Canadian Rockies, but that year was memorable for the loss of Philip S. Abbot, who was killed in an attempt to climb Mt. Lefroy. The party, was composed of Abbot, Fay, Thompson, and Little. The accident occurred near the summit of the mountain. Abbot was attempting the ascent of a gully leading upward to the crest; Little was standing at its base awaiting a call to follow up. Fay and Thompson were on a ledge a short distance below. Professor Fay says, "A moment later Little was conscious that something had fallen swiftly past him, and knew only too well what it must be. Thompson and I, standing at the base of the cliff, saw our dear friend falling backward and head foremost; saw him strike the upper margin of the ice slope within fifteen feet of us, turn completely over, and instantly begin rolling down its steep incline"; and so perished a most enthusiastic and competent alpine climber, an intense lover of Nature in her wildest haunts, and a man of splendid and lovable personal character.

The following year witnessed the conquest of the mountain, and, strange to say, on the very anniversary of Abbot's death. A party of nine accomplished the feat, the most difficult attempted up to the time of the accident. It consisted of representatives of the Appalachian Club and of the English

Alpine Club, with their Swiss guide. The conditions for climbing were ideal, and the route was practically the same as Abbot's. A start was made from the little chalet at Lake Louise at 3 a.m., and the summit of the peak was reached at 11 a.m. The mountain was conquered, and in some measure it was felt that a fitting tribute to poor Abbot had been paid, and that his long rest would be easier on that account.

And so it goes: year after year, conquest after conquest was added to the steadily increasing list. Areas of exploration were pushed out north, south, east, and west, until it became necessary to make long and extended expeditions to reach still unclimbed peaks of great magnitude. Many daring exploits stand out prominently in the pages of the history, to which I am unable to refer from lack of space.

The year 1899 was marked by the arrival at Glacier of properly accredited Swiss guides, brought out by the C. P. R. The first of these were Edouard Feuz and Christian Häslér, of Interlaken. Later, their numbers were increased as their services were more in demand, but always, to the present day, the names of Feuz and Häslér have been represented, though now by a younger generation.

The first ascent of Mt. Stephen by Miss Mary M. Vaux, in 1900, and of Mt. Sir Donald by Mrs. E. Evelyn Berens, a bride who was spending her honeymoon in the Canadian Rockies, in 1901, established a precedent, and also the fact that the so-called weaker sex is not so very much weaker after all. Mrs. Berens' experience is summed up in her own words as follows, "Be wise, friends, and never despise a mountain; it always gets the best of you in the end. . . . In climbing, always look for the next handhold and foothold, and nothing more, for if you look down it is apt to frighten you, and if you look up, you get discouraged."

The Government Topographical Survey also reached the Selkirks in 1901. In that year and the one following, the writer mapped a considerable part of the range by photographic methods, and for such purpose made the ascent of more than a hundred peaks. The results are to be found in "The Selkirk Range," by A. O. Wheeler, published by the Department of the Interior in 1905. It is accompanied by a volume of maps.

A sad note at this time was the death of the mountaineering dog, Fritz! Only a dog! And yet with more right to the word "mountaineer" than many who lay claim to it. He was killed by a fall of 700 feet. In his two summers in the Rockies he had climbed many peaks; among them were Swiss Peak, Rogers Peak, Mts. Roy, Avalanche, Grizzly, Cheops, Abbott, Cartier, Mackenzie, and many others. He was well known in the Selkirks, and a general favourite.

It was in 1901, also, and for two years after, that the world-renowned veteran, Edward Whymper, the conqueror of the Matterhorn, was in the Canadian Rockies, under the auspices of the Canadian Pacific Railway, for the purpose of reporting upon their attractions as a world's playground. He was then over sixty years of age, and did nothing remarkable in the way of mountain climbing. He was assisted by the Rev. (now Sir James) Outram.

In October of the same year, Outram made a dash for Mt. Assiniboine, 11,870 feet, making a most spectacular descent by the north arête, and so a complete traverse of the mountain. Outram came again to the Main Range the year following, and made a big killing among the high peaks still unclimbed, capturing first ascents of Mts. Columbia, 12,500 feet, Lyell, 11,950 feet, Bryce, 11,750 feet, and Alexandra, 11,650 feet, as well as a number of others. His book, "In the Heart of the Canadian Rockies," published in 1905, deals chiefly with the Main Range. The vivid accounts of his explorations and climbs are intensely interesting reading, and the categorical information it contains is so valuable that it should be in every library and collection of mountaineering books.

In the heart of the Rainbow Mountains, resting on secure foundations, rises the Monarch of the Main Range, Mt. Robson, 13,068 feet. It is the grandest and most spectacular peak of the entire system, surrounded on all sides by what may well be called a climax of mountain scenery. In every direction towering black precipices and tumbling icefalls meet the view, and avalanches roar downwards from its summit throughout the year. The wind-swept crest is covered by perpetual snow; fantastic ice shapes crowd one another upon its serrated ridges. All about are wonders of alpine scenery; great water leaps, such as the Emperor Falls, the Falls of the

Pool, the White Falls, and many others, fill the Valley of a Thousand Falls with muffled thunder. Berg Lake, Lake Adolphus, and Lake Kinney sparkle like jewels. Tumbling Glacier, a wildly broken icefall, descending a straight five thousand feet from the sheer precipices of the north-west face, buries its nose in the depths of Berg Lake and sends tiny icebergs floating over its blue-green waters. The whole eastern base is filled by the Robson cirque and glacier; here are accumulations of ice and snow that are beyond conception; icefall tumbles over icefall, and snow-mound is piled on snow-mound in such a variety of forms that the wonder of it never ceases. On the west and south sides, the great lines of precipitous cliffs and the individual forests perched high on the intervening shelves of rock give the mountain a stern, unapproachable look that adds much to its grandeur and immensity. Twice have human beings stood upon Mt. Robson's crest, and then only after a hard-fought battle.

The group of mountains of which Mt. Robson is the centre had long been the Mecca of mountain explorers. Twice Professor Coleman, of Toronto University, essayed its conquest without success, each attempt adding to the history of the mountain a tale of vast expenditure of energy, of great patience, and of much hardship and privation. It was not until the year 1909 that the Rev. George Kinney, who had been with Dr. Coleman on the two previous attempts, succeeded in making the ascent after a desperate fight. He was accompanied by Donald Phillips, a lad then making his first climb of magnitude. After suffering immense hardships from cold and hunger, they reached the crest of the mountain at the third attempt. Failure, from lack of food, stared them in the face and made them take such awful risks that to-day all who read the tale are filled with wonder that they returned alive to tell it. On this last ascent, Kinney and Phillips took such desperate chances, with a wholly inadequate equipment, that although they did not reach the actual highest point of the crest by some sixty feet, they well earned and deserve full credit for the first ascent. The story of the two first attempts and of Kinney and Phillips' ascent is told by Mr. Kinney in the 1909 and 1910 issues of the *Canadian Alpine Journal*.

Dr. Coleman has done much to explore the central portion

of the Main Range, that lying between the Canadian Pacific Railway and the Grand Trunk Railway, as well as in the vicinity of Mt. Robson. His book, "The Canadian Rockies, New and Old Trails," published in 1911, together with a map, is of great interest and has done much to spread abroad a knowledge of this vast area of cloud-capped peaks, of ice and snow, and of valleys filled with primeval forest.

The year 1906 was made memorable to climbers through the organization of the Alpine Club of Canada. Delegates from all parts of the Dominion gathered at Winnipeg for this purpose. Its main objects are the scientific study and exploration of Canadian alpine and glacial regions, the encouragement of mountain craft, and the development of the Canadian Rockies as a national recreation ground.

In each year a big camp is held in some beauty spot of the mountains, where members gather to enjoy their holidays and to come in touch with Nature in these mountain fastnesses. Eleven such camps have been held, viz., at Yoho Pass, Paradise Valley, Rogers Pass, Lake O'Hara, Consolation Valley, Sherbrook Lake, Vermilion Pass, Cathedral Mt., Robson Pass, Upper Yoho Valley and Ptarmigan Pass.

At these gatherings hundreds of young men and women have been brought in contact with the thrall of the peaks, have been given their first lessons in mountaineering, and have learned the fascination of the great hills.

Best of all, the Alpine Club has placed within the grasp of many people of small means the opportunity to visit and enjoy these scenic glories, which are Canada's greatest heritage, and produce a feeling of exaltation that is pure and beneficial in the highest degree.

Many fine feats of mountaineering have been accomplished. Chief among them stands out the complete ascent of Mt. Robson, made in 1913 by W. W. Foster and A. H. MacCarthy, in charge of the Austrian mountain guide, Conrad Kain. The activities of the club have led to a widely extended series of exploration and individual mountaineering, but in the ten years of its existence only two accidents have occurred.

In 1909, the club erected at Banff—usually known as "Banff the Beautiful"—high up on the slopes of Sulphur Mt., a charming club house in connection with which a permanent

camp is operated each summer. Here, the members sleep under canvas and have meals in the club house; here, also, nightly, around the glowing logs in the great fireplace of the assembly hall, the members in caucus recount the experiences of other days, when, in a closed circle, they have gathered round a still greater fire and watched the sparks fly upwards towards the twinkling stars, while all around the silent forest and towering gray peaks, with their white glaciers, kept eternal vigil. The great fireplace in the assembly hall was presented to the club by the Vaux family of Philadelphia, in memory of William S. Vaux, jr., a student of glaciers, whose excellent work in this direction in the Selkirk and Main Range has been referred to.

In the immensity of the subject, but poor justice can be done in such a brief sketch as this. Words fail to convey a sense of the brightness of the skies, the lights and shadows on the snow, the ever-changing greens of the forest, and the nameless shades of blue seen in the mountain tarns. The crash of the avalanche, the thunder of the waterfall, and the roar of the rushing torrent must be heard to be realized; the aromatic smell of the balsams and the soft beds of pine boughs must be real to be appreciated.

While the outstanding highest peaks of the Rockies have, for the most part, been climbed once or twice, there are so many of nearly equal altitude that have not yet been climbed, and there is still so large an area that is actually unknown and unmapped, that the Canadian Rockies may yet be considered a new field for mountaineering and exploration. As the European Alps are known to-day, the Rockies are quite unknown, and it will be very many years before a similar knowledge will be consummated.

In referring to some of the first ascents and other climbs made, I have, according to mountaineering etiquette—a mighty poor etiquette, to my mind—given the credit to the visitors, or, in the English phraseology of the mountain guide, “the gentlemen.” In the large majority of cases the credit really belongs to the professional guides who have been in charge—Feuz, Kaufmann, Häslar, Bohren, Aemmer, Jorriman, Kain—men whose names are linked with our mountain peaks for all time.

These men do all the hardest part of the work; they carry the paraphernalia of climbing; they cut steps in the ice slopes; they are the first to ascend and the last to descend, all others, in tight places, having the assistance of a stout rope manipulated by the iron muscles of the guide; theirs is the responsibility of the choice of a route and, the chances of life or death such choice entails, and well they assume it. For patience, perseverance, and good temper, I do not know their equal. It can, moreover, be said that not one of them has yet lost a life in the Canadian Rockies, and the record is not due to a lack of opportunity. No praise is too high for these powerful, patient, and fearless men.

THE FUTURE OF BRITISH COLUMBIA

BY THE HON. SIR RICHARD MCBRIDE, K.C.M.G., LL.D., K.C.*

The future of British Columbia is a big thing to talk about, but scarcely an uncertain one. In saying that, I am not assuming the rôle of prophet, because one has only to have a certain set of conditions in existence and the outcome, in all human probability, is certain. I was born in British Columbia just at the time it was taking that great step in its history, to become part of Canada. That was the second important step in its career. The first, after the organization of colonial government, was the union of the two colonies of British Columbia and Vancouver Island, which was really a prelude to Confederation. I, of course, cannot personally remember the conditions which existed at the latter epoch, but I know that the white population was less than 10,000, and that times were very bad. Mining was stagnant, and other industries had just begun to develop. In fact, there was not sufficient population to maintain industries, and there was practically little or no foreign outlet for our products. We were in a state of physical and commercial isolation. Had the people of the province at that time not been filled with hope of the future, and had they not been impressed with the extent of its potential resources, the outlook would have been very depressing indeed. I remember very well how slowly the province developed for a long time. Even as late as 1891, which was just after the Canadian Pacific Railway began to operate successfully, the white population was only about 65,000. Then we began to see the effects of increased facilities of transportation. Progress was evident in rapidly in-

* Richard McBride was born (in New Westminster, B.C.) 1870; LL.B. (Dalhousie), 1890; called to Bar, 1892; entered B. C. Parliament, 1898; Minister of Mines, B.C., 1900-1; leader of the Opposition, 1902; Premier of British Columbia, 1903-15; K.C., 1905; F.R.C.I., 1911; created K.C.M.G. by King George, 1912; hon. LL.D., Univ. of California, 1912; resigned Premiership, December, 1915, and went to London as Agent-General for British Columbia.

creasing ratio, and population more than doubled in each succeeding decade. Production, which, to a large extent, represents the utilization of natural products, was practically nil in 1871, and was still small in 1891. It has quickly mounted to over \$100,000,000 per annum. When we consider that the resources from which these very large values have been derived by a population of about 450,000 are still in the infancy of their development, it must be apparent to what extent the future will bear fruit.

It is not on the past conditions, however, satisfactory as they have been in recent times, that I wish to dwell. We are entering an entirely new era. I am going to include the present war in its general bearing on the future, but to eliminate temporary war conditions and effects. People are being affected by the war in a psychological way, very much as they sometimes are during a thunder-storm. They get excited and lose the proper proportion of things. None of us see, or think, quite as we do when conditions are normal. We forget that there will be peace again, and that the programme of the past will be resumed. Progress has only been checked. A railway train meets with an accident and traffic is temporarily suspended, but the track is soon cleared and business is resumed.

The things which will enter into the future of British Columbia, are mainly, these:—

First, the Pacific ocean, through the Panama Canal, and transcontinental lines, is assuming an importance for trade routes which, before many years, will be equal to that of the Atlantic. The increase of the Pacific trade during the past ten years has been enormous. British Columbia, by reason of its geographical position, and numerous splendid harbours, is most favourably situated on the American Pacific coast to take full advantage of that new trade.

Second, it has the natural resources to supply cargo in great abundance. Admittedly, we have the largest commercial stand of accessible timber on the coast, and lumber is a prolific source of sea-going freight. The supply of timber, under our policy of conservation, is indefinite. At present, there is a shortage of bottoms, and rates are inordinately high, so that the markets that otherwise would be open to

us are, practically, available only to a limited extent, but the war which created these conditions will, when ended, remedy them, owing to the tremendous demands arising out of reconstruction. Allied with the timber industry is the manufacture of pulp and paper, and this is now assuming such large proportions that we may with great confidence look to a tremendous development in future years. The iron and steel industry, still untouched, is as certain to be a great factor in production. It requires much capital, it requires cheaper fuel than we have now, and it requires an assurance of markets; but in the readjustment of trade conditions, and when the establishment of an equilibrium between the east and the west is assured, the iron industry will attract that attention due to its great importance. Capital dallied with the pulp and paper business on the coast for a considerable time before launching out in a commercial way, just as it is doing with our iron deposits. The mining industry on the coast has come to the front very rapidly, is expanding in a large way, and must continue for a long time to come, possibly centuries, to furnish extensive tonnage. Then, again, our ever-growing deep-sea fisheries, which must depend for their fullest success upon ample shipping facilities, afford considerable traffic.

Wherever fruit ranching can be successfully carried on there also mixed farming—including stock and the growing of soiling and forage crops, such as alfalfa, clover, peas, vetches, etc.—is practicable, the combination producing excellent results.* We know now that we can obtain large orders for fruit and agricultural products in Australia, South America, and elsewhere. I need not refer to our coal, which has had its principal market for years south of the line. It is extremely probable we can find a large market for cement, flour, and other products across the Pacific.

Third, British Columbia has now three transcontinental railways, and a number of branch lines, which, though only inefficiently as yet supplying the wants of transportation, nevertheless, will make a vast difference in the opening up of

* During the first session of the British Columbia Legislature in 1916—since this article was written—an Act was passed establishing rural credits within the province, the sum of \$1,000,000 (£200,000) being voted for the purpose. Arrangements are now being made to put the Act into operation.—Ed.

the province and bringing its products to the coast. One fact of supreme importance is that they tap the wheat-fields of the middle west, and will bring to our doors, and to our elevators, grain that will go to the Orient, and to Europe, by way of the Panama Canal. Of special importance is the Pacific Great Eastern, whose termini are in Peace River and Vancouver city, between which will be a direct line of connection. More recent investigations and developments in the vast area included in the Peace River country have confirmed all previous anticipations as to its immense potential value, particularly as to grain and several mineral assets, such as coal, oil, salt, asphaltum, and natural gas.

Fourth, the climate of British Columbia has especial attractions, and this, coupled with opportunities for fishing, shooting, boating, mountain climbing, motoring, and sport and recreation of all kinds, destines its future in respect of tourist travel and residence to be one by itself in all Canada, and in the Empire.

Fifth, scenically, British Columbia is a vast Switzerland—many Switzerlands rolled into one—and possessing many of the physical characteristics accentuated which have made that little republic of Europe so famous.

Sixth, the war, though a present great calamity, and to be deplored beyond all events in history, will bring many material as well as moral blessings in its wake. The outstanding fact is that the trade diverted from Germany and Austria will be a permanent factor, and another is that the war will result in a consolidation of the Empire on lines that will give to British Columbia a fresh significance in the business world.

Of course, the building of railways and highways through a country so vast and mountainous in its exterior, and the development of resources generally require an amount of capital quite out of proportion to that which is necessary in other provinces, but with its varied and extensive wealth, which expenditure alone can make available, who shall say that the future of the Pacific coast province is not certain and momentous?

LUMBERING IN THE WEST

BY THE HON. WM. R. ROSS, M.A., K.C., M.P.P.*

The important place which wood occupies among the materials required by the world's business is little appreciated by the public. It is so commonly and widely used, and has been for so long a time, that this very fact of universal use has prevented realization of the tremendous part it plays. The truth contained in the old saying that we "cannot see the forest for the trees", applies with equal force to wood and wood products. The substance is lost sight of in the multiplicity of its products and uses. Actually, in quantity, the annual consumption of wood is greater than any other single material used by man, and in value is exceeded only by cereals and meat. Of all the products of the soil (for a tree, technically, is a vegetable) wood is the largest and most valuable single crop. As fuel it warms most of the people in the temperate zone, and helps to cook their food; it is largely used to house the greater part of the world's population, and most of the furnishings of houses are of wood. Wood also protects the field crops, shelters domestic animals, and largely composes the implements of agriculture.

In transportation, on land and sea, wood is again indispensable, and constitutes the greater portion of the material used in vehicles, railways, and ships. In the manufacturing industries wood is required for an inconceivable number of purposes, both in the machinery and tools, and in their products. Wood, again, is the chief material entering into the manufacture of paper, for newspapers and books. It produces oils and tars, and even drugs. Lastly, it can be made into food, and holds promise of being made use of for this purpose to a much greater extent in the future. In the

*William Roderick Ross: born 1869; B.A., 1887; M.A., 1890; has sat in B. C. Parliament since 1903; K.C., 1906; appointed Minister of Lands, Province of British Columbia, 1910.

necessities of mankind—food, shelter, heat, clothing, and transportation—in the manufactures and the arts, wood is thus an essential material, and its uses are increasing, rather than decreasing.

To supply the wood required by the world, the growth of millions of acres of forest are required, the harvesting and manufacture of which constitutes, next to the production of food and transportation, the world's greatest industry.

It is with no fear of the future, therefore, that British Columbia faces the fact that on the harvesting of wood, rather than of cereals and other agricultural products, its prosperity and development depends. British Columbia is a forest province, as her natural conditions of topography, soil, and climate indicate. With forests unsurpassed in the world; with ice-free ocean ports, giving its forest products access to the world's overseas markets, and four transcontinental railways reaching the rich interior markets of Canada and the United States; with the certainty that its wood will constantly increase in value, the province is content with its prospects, and has set to work, intelligently, to make the most of its forests, and ensure the permanency of the lumber industry.

The first requisite to attain these ends was a study of forestry and lumbering in relation to the future of British Columbia. Such a study disclosed the fact that a very large part of the province was suitable only for the production of timber; that the amount of merchantable timber was so great as to render a very considerable increase in the annual crop which could be harvested; that the natural conditions for the practice of forestry were superior to those in many other countries, protection from fire being the only thing necessary; that the products of British Columbia forests could compete successfully in quality with those of any other country; that larger markets for lumber could be developed, if determined efforts were made to that end; and, lastly, that the importance of managing the province's forest resources on a practical and scientific basis was so great as to demand the creation of a government service, whose whole activities would be devoted to it.

The government, as a result of this study of its forest

problem, energetically attacked the work and adopted a vigorous and progressive forest policy. Although much remains to be done, the work has advanced to such a point that the soundness of this policy seems to be established, since further investigation of the forest resources have shown even greater possibilities of development. The estimates of the amount and value of its forests were confirmed, and it is certain that the present cut can be increased four or five times before the annual growth of the forests is reached. All that remains is the development of markets for such an increased cut, and a concerted and vigorous effort is now being made by the government and the lumbermen to create such markets. In this work the Dominion Department of Trade and Commerce is energetically co-operating.

Secure in the knowledge of the quality and quantity of her forest products, and certain that a market will soon be found to take all the material her forests can supply, the government and people of British Columbia look forward with confidence to the future of the lumber industry.

FRUIT-RANCHING IN BRITISH COLUMBIA

BY J. J. CAMPBELL*

In 1913, there were in British Columbia about three million fruit trees, of which about two millions had been planted since 1907, and the greater part of the remaining million within the previous decade.

Of these three millions, about two and a quarter millions were apple trees; less than two hundred thousand were pear trees; about the same number were plum and prune, and about three hundred thousand were peach, apricot, and cherry trees.

The total production for that year was 465,412 boxes of apples, 13,554 boxes pears, 139,492 crates plums and prunes, and 135,652 20-pound crates of peaches and apricots.

There was also a considerable production of cherries, strawberries, raspberries, blackberries, loganberries, and currants.

The remarkably rapid development, indicated by the large proportion of young trees, has now been checked, but with the increasing age of the trees, the production will increase for years to come, quite independently of the yield from new-planting.

The attention of growers, in the present time of stress, is directed to reducing the cost of production, and to increasing the efficiency and economy of distribution rather than to extension of orchards, or any other form of capital expenditure. This is true, also, of orcharding in the neighbouring

*J. J. Campbell: born 1859; Indian agent, Moose Mountain, 1886-1897; office manager, Hall Mines, 1897-1899; general manager, Hall Mining & Smelting Co., Ltd., 1900-1908; secretary-treasurer and mem. executive, Hudson District Mines Ass'n., 1899-1902; treasurer and mem. executive, British Columbia Mining Ass'n., 1901-1908. Began development, Bonnington Orchards, 1905, and of Duntulm, 1906. Mem. Provincial Board of Horticulture, B.C., 1908-1911; member, 1911-1914, (acting chairman, 1913); Royal Commission on Agriculture for British Columbia.

States of Idaho, Washington, and Oregon, where also a phenomenal increase took place in the areas planted to orchards.

Within the past eight or ten years, the spread of horticultural knowledge and the improvement in general practice, in Canada, have kept pace with the growth in plantations.

This is largely due to the active interest of the provincial government. For some years the Board of Horticulture, composed of the Minister and Deputy Minister of Agriculture, the Chief inspector of Fruit Pests, and a few representative fruit growers—who served without remuneration—kept in touch with the needs of the young industry, and it was largely upon the advice of this board that the various measures for the furtherance of the welfare of fruit-growing were taken by the government. The inspection service, under its regulation, and directed by Thomas Cunningham, the veteran chief inspector, has been very effective in preventing the importation of pests, and the spread of any pest, or disease. It has gained for the province a reputation for freedom from plant pests that is to-day a valuable asset.

What it means, in added wealth to the country, to be free from such pests as Codlin moth and San José scale, might be estimated in startling figures; but what it means to the individual growers, can be appreciated only by fruit-growers in other countries, where continual warfare with such enemies is necessary in order to avoid serious loss.

From this beginning has grown a horticultural branch—with a chief horticulturist and one or more assistants in every large district, a plant pathologist and assistant, two market commissioners, an exhibition commissioner, and other officers. Short courses, lectures, bulletins, demonstrations, packing schools, pruning schools, and demonstration orchards are some of the means by which the practical knowledge and efficiency of the fruit growers is being increased.

The assistant horticulturists spend much of their time visiting and advising growers, and, at the same time accumulating a stock of experience, which goes to swell the sum of knowledge available for all the instructors and growers throughout the province.

By trips of general inspection, Chief Horticulturist Win-

slow keeps in close touch with the conditions in every district. The plant pathologist is occupied not only in investigations, but also in answering numerous letters of enquiry.

The market commissioners, with headquarters at Calgary and Vancouver, collect information and distribute it by telegrams and weekly bulletins through British Columbia.

The growers are thus kept informed as to the supplies of fruit, and the selling prices, wholesale and retail, in all the coast and prairie markets, and also conditions and prices in the competing districts in the United States; are advised what packages are most popular; are frankly told of their shortcomings, and are benefited by ingenious advertising schemes for drawing the attention of the consumers in those markets to the reasons *why* they should use British Columbia fruit.

For some years past there has been—in addition to the Board of Horticulture—a Provincial Fruit Growers' Association which is assisted by the government, and of which the Minister of Agriculture, and his deputy, are *ex officio* members, and the chief horticulturist is secretary.

Local associations throughout the province are affiliated with this central association. The membership of individual growers is encouraged, and the association forms a convenient vehicle for communication between the growers and the government. An executive committee, and committees on legislation, transportation, labour, and advertising, give special attention to all matters affecting the industry.

Allied with fruit-growing pursuits are all kinds of mixed farming, and the importance of attention to dairying, hog-raising, poultry-raising, and bee-keeping, as useful adjuncts to fruit-growing, is being emphasized by the Department of Agriculture, not only for the income to be derived from them, but also for the saving in the cost of living, the maintenance of the fertility of the orchards, and the fertilization of the fruit blossoms. Under the Live Stock Branch—headed by Commissioner Macdonald—there are now dairy instructors, veterinarians, soil and crop instructors, poultry instructors, and apiarists—working directly and through live stock, dairying, poultry, and bee-keeping associations, and Farmers' Institutes—to spread knowledge of the best methods in all branches of farming.

Lecturers—prominent in various departments of agriculture and horticulture, co-operation, and marketing—are brought in from the United States, to speak at conventions, and to give lecture tours through the province.

In 1912, a Royal Commission on Agriculture was appointed, which, after an exhaustive enquiry, made a number of important recommendations. These were submitted to the provincial Legislature near the close of the session of 1914. The report of the commission was approved by the government, and by the press irrespective of party.

In the session of 1915, the most important and far-reaching of the commission's recommendations was adopted by the enactment of the Agricultural Act, which will become operative as soon as the financial conditions, disturbed by the war, make it possible to dispose of bonds (for the purpose of the Act) at a reasonable rate. This Act provides for loans being made, by an Agricultural Credit Commission, on long terms at a low rate of interest, and with repayment by amortization, on the security of mortgages.

In considering the probable future of the fruit-growing industry of the province, there can be no doubt as to the tremendous stimulus that the operation of this Act will give. In large districts, climatic and soil conditions are unexcelled for the production of fruits of the highest quality, but to acquire the necessary land, prepare it, plant, and care for an orchard until it comes to profit-bearing age, a good deal of capital is required.

It is true that in the meantime returns may be obtained from small fruit, vegetables, poultry, cows, etc.

There are many instances of success by people who began with very little money; but the period of waiting until an orchard of mixed varieties of apples becomes a reliable source of revenue, has, in many instances, proved to be longer than was expected from the information generally supplied ten years ago. Apparently, in those estimates no account was taken of the difference in the age at which different varieties of apple trees come into profitable bearing. Insufficient allowance was made for unfavourable blossoming seasons interfering with the setting of fruit. Markets were to be uniformly good.

Results, accordingly, fell short of expectations, causing in many cases disappointment, anxiety, and even embarrassment. With the help of loans, under the new Act, it will be possible for thousands of industrious men to make farm and orchard homes in British Columbia, who otherwise would be debarred by the lack of sufficient capital.

The war prevented other recommendations of the commission being dealt with at the same session of Parliament, but action upon them may be looked for later.

Another good work, which the war has interfered with, is the development of the plans of the new British Columbia University. Breadth and thoroughness characterize them, and prominence is to be given to all branches of agricultural science. The Dominion Government assists the Provincial Government in its educational work by grants. It also maintains experimental farms at Saanich, on Vancouver Island, and at Agassiz, in the Fraser valley.

The man embarking in fruit-growing now is in a very different position to that of his predecessor of even ten years ago. To-day, he may study weather records of the different districts for a term of years; learn their maximum and minimum temperatures; compare the number of days, and the total heat units, during the growing season, and the mean temperatures during the hottest six weeks; he may ascertain the varieties of fruits that have been found to attain the highest degree of excellence in each district; he may get sound advice from government experts at every step, and instruction in every operation. He may choose his home with farms and orchards all around him, where he may study the methods practised, compare results, and avoid the mistakes of the past. He can hire labour that has been trained in the district. He may avoid the years of waiting and uncertainty, by buying an orchard already bearing, where the initial difficulties have been overcome, and where the trees tell their own story.

British Columbia is about three times the size of the British Isles, and has a climate varying from the cool humidity of the islands of the Pacific to the dry heat of the valley of the Similkameen.

Without venturing upon prophecy, as to the rapidity and extent of the future growth of fruit-growing in British

Columbia, it will be safe to venture some premises from which deductions can be made.

The value of fruit annually produced in the province, at present, is not much over a million dollars. After allowing for failures, through unsuitable conditions or neglect, the orchards now planted should, before many years, yield about five million dollars' worth of fruit per annum. Profits, generally, for the past five years—on mature orchards, reasonably well managed and in suitable locations—have been good.

The most unfavourable feature in the business has been the low price for some kinds of fruit, particularly apples, in 1912 and 1914. In 1912, this was largely attributable to a sudden increase in production in Washington, Oregon, and British Columbia, a large number of young trees coming into bearing coincident with large fruit crops in other parts of the continent, and for which the marketing organizations were not prepared. In 1914, the dislocation of business by the outbreak of war, the interference with shipping, and the fear that exports would be impossible, caused a panicky feeling, and a large part of the crop was sold early at low prices. Later on export business was established and fair prices were obtainable.

Energetic steps have been taken within the past two years to improve the marketing organizations in the United States and Canada, to lessen competitive price-cutting, and to widen the distribution of apples.

New markets in foreign countries are being sought, and the consumption in the home markets is being stimulated. The Canadian policy of protection to its own industries from the action of foreign competitors in dumping surplus production upon the markets of the Dominion, must be depended upon as a safeguard from such a danger.

The mutual benefits which would accrue to Australia, New Zealand, and Canada, from reciprocal tariff arrangements, will, it is hoped, lead to such action as will materially assist the British Columbia apple-grower in securing a large part of the trade of the sister dominions.

Leaving out of account any advantages that British Columbia growers may in the future have over foreign competitors in the markets of the Empire, their position in open

competition should become much stronger by reason of the increasing yield per acre, resulting from the larger proportion of mature trees, and of the equalization of costs with those of their competitors.

In the past year or two, labour costs have been reduced one-fourth. The number of skilled labourers is increasing. With a greater volume of business should come cheaper supplies of spray and machinery, cheaper boxes, and other essentials.

The Panama Canal will lessen the cost of transporting apples from the Pacific coast to European markets. The important and rapidly-growing markets of Alberta and Saskatchewan are about half as far from Nelson and Vernon, as from Yakima and Wenatchee, in Washington. The fruit from Washington pays duties and inspection fees.

In quality and appearance the apples of British Columbia are unexcelled. They have won large numbers of prizes in open competition in the best United States exhibitions, and the most coveted honours at the English shows. The freedom from loss of fruit crops—due to excessive rains, drought, violent storms, and spring frosts—will prove an important factor in economical production.

With milk, cream, butter, eggs, poultry, mutton, pork, vegetables, fruit, and honey produced on the farm; with firewood in many districts costing only the labour necessary to procure it; with low taxation on property; with no temptation to keep up appearances inconsistent with means; with plenty of sport and recreation at trifling expense; a small income from an orchard, or other source, provides for the wants of a family of simple tastes.

It is surely one of the pleasantest ways for the business and professional man to get "back to the land". The production of any food staple, under conditions which enable it to be profitably sold in the world's markets, in competition with the same article produced in other countries, should be a stable industry. In view, therefore, of the inherent soundness of its position, and the attractions it offers, it is only reasonable to anticipate for fruit-growing in British Columbia a great future.

THE FUTURE OF MINING IN BRITISH COLUMBIA

BY S. S. FOWLER, M.E.*

It is evident that one cannot approach the consideration of this subject with the same feeling of certainty that one's predictions will finally be found correct, as one may enjoy who would forecast the development of wealth from the forest, or the field. The potentialities of these may be easily gauged, for they are literally superficial. Quite differently, the mine-to-be avoids the light; it usually extends its greatest dimension downward, and commonly surrounds both the seeker and the worker by a maze of perplexities and physical difficulties.

Several years ago a prominent mining engineer, in the course of an article on a similar subject, deduced the fact that the Rocky Mountains in Mexico and the United States had produced metals of a value of well over three millions of dollars per mile of length of the system. Applying this rate to Canadian territory, he, rightly, foretold great mining possibilities, and concluded that, "no one can place a limit on the number of 'Cripple Creeks', or 'Klondykes', or 'Rands', that lie hidden away in the recesses of the 1,600 miles of Rocky Mountains now practically unexplored in Canadian territory." This conclusion was perfectly right—no one can. Those who know this author, realize that his statement was meant to be optimistic; but those who do not, are left unsatisfied, and somewhat in the same position as that ancient, who,

*Samuel Stewart Fowler: born (New York) 1860; Columbia Univ., B.A., 1881; M.E., 1884; mining and metallurgical engineer in various parts of U. S. until 1889; general consulting engineer in British Columbia since. Has had charge of the development, equipment, and operation of several important metal mines, mining plants, stamp mills, concentrating and power plants of B.C.; is general manager of the old Bluebell Mine, on Kootenay Lake; Past-President Canadian Mining Inst.; mem. of Inst. of Mining and Metallurgy, London; Mining and Metallurgical Society of America; Am. Inst. of Mining Engrs., and the Am. Electro-chemical Soc.

upon consulting the oracle, was told, "I say unto you that the Romans shall conquer." Let us, however, approach the subject in a less mathematical, and possibly more logical, way.

For years past, students and writers of economic geology have noted and described the intimate relations found to exist between many, if not most, of the ore-deposits of western America, and the igneous rocks. They have shown that these rocks are presumably the sources of the metallic minerals found localized, not only in the sedimentary and metamorphic rocks, but in themselves as well. The old type of prospector seldom concerned himself seriously with other than the most casual consideration of this relation. On the contrary, the mining engineer of to-day, whether engaged in pioneer field-work or in the operation of mines, while he may not be obsessed with the essential nature of the relation, grows more and more to realize its importance, and even to regard with some suspicion the absence of these rocks from the locus of his work. Hence, at least, some of the importance of geological surveys.

To cover adequately, by surveys, so great an area—some 385,000 square miles—as that embraced by British Columbia, is manifestly impracticable in as short a time as those directly interested could wish. About the year 1885, the late Dr. Geo. M. Dawson began a geological reconnaissance, particularly of the southern part of the province, and in later years continued his examinations into the northern districts. As a result of the working of his keen eyes and equally keen intellect and imagination, together with the able efforts of his successors in the field, we now have the benefit, so far as they go, of geological maps and reports of the highest grade. These show that in the great region extending from the main range of the Rockies westward to the sea, there is a prodigious development of igneous rocks, in most of their several phases from acid to basic, which occur, as to form and mass, in manner varying from the great Coast Range and Nelson batholiths, through stocks, sills, and intercalations, to the thinnest of dykes; and, further, that in and about these are fragmental, sedimentary, and metamorphic rocks of sufficient variety and difference of age to form an interesting, if not quite complete, geological column.

While this tends to satisfy the first requisite of success and magnitude of future mining, it is doubtless true—in fact, is known—that there are many areas which are presumably unfavourable to the occurrence of the metallic minerals, and that others which are “kindly” will later be proved to be barren. Chief among the presumably unfavourable regions is that great triangle of territory lying east of the Rockies, west of the 120th degree meridian, and between the 54th and 60th parallels, embracing over seventy thousand square miles, drained by the Liard and Peace Rivers, wherein the uppermost strata are supposed to indicate an absence of economic minerals other than coal. In so great an area it must be evident, however, that there is ample room for still unknown and isolated localities, which may be intensely mineralized. In support of this idea, one has only to cite the instance of the Black Hills district of South Dakota, with an area of only five thousand square miles, forming, as it does, a veritable island of mountains in a sea of rolling prairie, hundreds of miles from any other mining region of consequence, and containing, among others of importance, one of the greatest single gold-mines of the world—the famous Homestake.

In a broad view, then, afforded by a study of such surveys as have been made, but which still leave so much ground to be covered, may we not justly consider that the future holds great possibilities for successful mining? It is difficult to conceive, indeed, in what way the geological conditions, *per se*, could be more favourable than they are, unless, perhaps, they would be improved by the restoration of those upper parts of ore deposits which have been removed by glaciation.

Upon the authority of the valuable series of annual reports issued by the Department of Mines for British Columbia the metal production of the province to the end of 1915, in round figures, has been about as follows:—

Placer gold from	1858.....	\$ 74,015,000
Lode gold	“ 1893.....	86,647,000
Silver	“ 1887.....	39,330,000
Lead	“ 1887.....	33,386,000
Copper	“ 1894.....	86,664,000
Zinc	“ 1909.....	3,263,000
Total		\$333,586,000

Omitting placer gold, and re-arranging the figures, we have the following illustration of the growth of lode-mining:—

Period	Value	Average per year
4 years ending 1890.....\$	260,000	\$ 65,000
5 " " 1895.....	3,525,000	705,000
5 " " 1900.....	34,660,000	6,932,000
5 " " 1905.....	63,845,000	12,769,000
5 " " 1910.....	75,598,000	15,120,000
5 " " 1915.....	81,683,000	16,337,000

Total.....\$259,571,000

PLACER GOLD. Placer gold was, and still is derived from widely separated areas. The maximum production was reached during the "sixties", after which the output waned until 1893. Then there were considerable increases, due to a limited introduction of hydraulicking methods of mining in the later "nineties"; but for various reasons the output has since fallen again. Considerable fluctuations in rainfall, the expense of storage of water, and consequent uncertainty as to sufficiency of power, have had much to do with the present condition of this industry, while in the case of unequipped properties, there has been a tendency of late years to await the advantages naturally to be expected from the completion of the Grand Trunk Pacific Railway, which lessens, by more than one-half, the hitherto long wagon-haul from the Canadian Pacific Railway to the "diggings" of the Cariboo district.

There still remain great quantities of unworked, auriferous gravels in this area of former greatest production, which, doubtless, will receive, in the future, the attention of capital; while in the still more remote northern districts there would seem to be numerous occurrences of pre-glacial gravels now generally covered by Tertiary lavas. To these Dr. Dawson refers* in encouraging terms as favouring a revival of active placer, or drift-mining. It is difficult to anticipate, however, that these deposits will be worked successfully, until they are much more easier of access than they now are.

LODE GOLD. With minor exceptions, of which there are no public, or dependable, records, "quartz"-mining for gold seems to have been begun after the advent of railways from the

* Government Survey of Canada Report for 1887.

Columbia River to Kootenay Lake—about 1893. In the vicinity of Nelson, and in the district to the south, extending nearly to the international boundary, and again, formerly at Camp McKinney, and latterly at Hedley, in the Similkameen River valley, and at other points, there have been produced many millions' worth of gold from so-called free-milling ores, by means of amalgamation, concentration, and cyanidation. The output still continues to be a profitable one in some cases, while in others, the mines have lain idle for several years. In only one or two instances, however, do they seem to have been exhausted.

Following is a table of output of lode-gold, as reported by the Department of Mines, re-arranged as to periods:—

Period	Value	Average per year
1893-1895	\$ 933,689	\$ 311,230
1896-1900	11,879,171	2,375,838
1901-1905	23,572,198	4,714,439
1906-1910	24,426,009	4,885,202
1911-1915	25,835,742	5,167,148
Total.....	\$ 86,646,809	

LEAD MINING began in a very small way directly after the completion of the main line of the Canadian Pacific Railway, deposits of the ore having been found both in the Rockies and Selkirks, adjacent to that line. These particular deposits, however, proved to be either too small, or of too low grade, to be of sufficient importance to lend much to the establishment of an industry. It is not surprising, therefore, that lead-mining did not prosper until about 1895, when transportation was brought within easy reach of either high-grade ore, or larger deposits in southern Kootenay, some of which had long been known.

The following table shows the production of lead:—

Period	Tons	Average tons per year
1887-1890	522	130
1891-1895	12,541	2,508
1896-1900	89,978	17,996
1901-1905	92,718	18,543
1906-1910	111,199	22,240
1911-1916*	111,862	22,372
Total.....	418,820	

*In last period production was curtailed for seven or eight months following the outbreak of the war.

Occurrences of lead-ore have been reported from time to time in places far distant from convenient means of carriage. These have been but little developed, if at all, for expenditure would be almost futile under the circumstances. However, when there is reasonable assurance of the approach of railways, it is entirely probable that development will be stimulated, and at least some of the known deposits become mines, which will either maintain, or increase, the present rate of output.

Quite apart from the influence of the construction of railways upon the future of lead-mining, it may fairly be expected that improvements in modes of treatment at the mines and smelteries will soon show improvement in results. The practice of ore-dressing is constantly changing for the better, and efficiency in the recovery of metals at smelteries is increasing also. The two together result in a material enhancement of the value of the ore, and thus tend to permit the mining of ore of less value than formerly. This will undoubtedly add to the value of resources which now are less actual than potential.

COPPER. Omitting any account of small shipments of selected ores during the early "nineties", copper mining virtually began after the erection of smelting works for the treatment at Nelson of silver-copper ores from the Silver King mine, and at Trail of gold-copper ores from the Le Roi and other mines at Rossland. These smelteries were built in 1895, but the success of their operation, or that of the mines, was somewhat hampered by the high cost of coke, which was necessarily brought from long distances. This difficulty was remedied by the completion of the Crow's Nest line, at the end of 1898.

By the close of 1899, another railway was built from the Columbia River westward to Grand Forks, Phoenix, Greenwood, etc., in the "Boundary" district. In this region there had been discovered in, or prior to, 1894, which proved later to be large deposits of copper-gold ores of self-fluxing nature. It was chiefly to facilitate the working of these properties, and the smelting of their ores, that this Columbia and Western Railway was constructed, and here again the influence of the presence of railways, in the immediate vicinity of the mines,

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is well illustrated in the following table of copper production:—

Period	Tons*	Average tons per year
1894-1895	639	320
1896-1900	17,068	3,414
1901-1905	82,501	16,500
1906-1910	107,470	21,495
1911-1915†	118,880	23,776
<hr/>		
Total	326,558	

As to the future of copper-mining, it is believed there are not known to exist any of those great mineralized stocks of igneous rocks, "porphyries", which have been made productive of great quantities of the metal, in recent years, in the western States, and which demand treatment by concentration on a scale involving daily tonnages from 10,000 to 20,000 or more. As against this deficiency, however, Vancouver, Texada, Moresby, and possibly other islands, afford instances of the occurrence of large areas of rather basic igneous rocks, which give promise of useful future development.

The perfection of the practice of copper-smelting, and of smelting-equipment, seems to leave little ground for anticipation that future changes will be especially noteworthy, in so far as copper-mining is concerned. On the contrary, recent advances in the art of concentration, as by means of flotation, and the rapidly-increasing knowledge and application of hydro-metallurgical methods, are destined to be of vital importance, as tending to allow the working of those ores which are both low in grade, and difficult, or relatively expensive, to smelt.

ZINC. From the inception of lead-mining, the ores of that metal have generally been found to be accompanied by zinc minerals. In only one instance of commercial importance has zinc-ore been produced, without a concurrent output of lead ore. The smelting of zinc-ores has not been hitherto commercially feasible in British Columbia, or adjacent territory, so that whatever zinc-bearing mineral has been mined for

*These figures include recent important additions from the mines on the Pacific coast, all easily accessible from tide-water.

†In last period production was curtailed for seven or eight months following the outbreak of the war.

sale, has been exported for smelting to points in the United States. This has involved not only a freight charge of about \$10 per ton, but a payment of customs duty amounting to ten per cent. (and more formerly) *ad valorem*. These exactions, together with the relatively high returning charges, and low recoveries, as compared with the smelting of lead-ores, have resulted in leaving only a small, if any, margin to the producer, in cases where the mining cost had to be borne by the zinc alone, or where the ore lacked a considerable tenure of silver. In view of the fact, however, that lead has usually been mined concurrently, and that silver is ordinarily present, shipments of zinc-ore, and concentrates, have become noticeable in recent years, although, for several reasons, irregular in volume.

For the past five years, these shipments have averaged annually between 5,000 and 6,000 tons, containing an average of about 2,600 tons of the metal.

In the earlier days of lead-mining—and before the introduction of the many recent improvements in the details of zinc-smelting practice, which have either lessened costs, or avoided the disadvantages of formerly undesirable ingredients—the zinc content of lead-ores was entirely wasted. As a whole, these ores probably contained quite as much zinc as lead, or, in round figures, 400,000 tons of the metal. It is not difficult to realize, therefore, how great has been the loss by the inability to utilize this resource.

SILVER. By far the greater part of the silver production from British Columbian mines has been derived from the ores of copper and lead, the former metal being accompanied by about one-third ounce to each one per cent. of metal in the ore, and the latter by about one ounce. There have been few, if any, discoveries of silver-ores as such, in the commercial sense, although there have been, and still are, mined, relatively small tonnages of the so-called “dry-ores”, *i.e.*, without appreciable quantities of lead, etc. In the case of the zinc-ores, the silver is usually present as an impurity, in the form of some rich silver-mineral. The future of silver production of the province will doubtless be more or less dependent upon, and in proportion to, the quantities of lead, copper, or zinc produced.

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The following table shows the production of silver:—

Period	Ounces	Average ozs. per year
1911-1915	15,526,901	3,105,380
1887-1890	221,089	55,272
1891-1895	2,551,561	510,321
1896-1900	19,798,303	3,959,661
1906-1910	13,350,082	2,670,016
1901-1905	18,727,352	3,745,470
Total	70,175,288	

IRON ORES. There are important deposits of iron ores, magnetite, and hematite, in several parts of the province. Up to the present time, there has been no incentive to develop these ores extensively, and, therefore, their magnitude is practically unknown. Despite the fact that some of these ores are easily reached from tide-water, and are accessible to limestone, and possible supplies of coke, no serious effort has been made towards their utilization for the making of iron or steel. The essential reasons for this are that accessible markets of sufficient volume are lacking, and the conditions of production such as to make the cost greater than the price at which imported, and at which eastern products can be delivered at the coast cities. Moreover, the completion of the Panama Canal must inevitably have the effect of maintaining a relatively low level of price until local controlling factors become radically changed. When the whole Pacific slope becomes much more densely populated, and manufacturing may thus attain a status corresponding to that which it enjoys in the East, there will probably be hope of working the local deposits of iron-ores. Until that time arrives, it would seem wise to let others supply its iron and steel requirements.

The production of the following minerals for the twelve months ending December 31st, 1915, according to the Bureau of Mines, Victoria, British Columbia was as follows:—

	Quantity	Value
Gold, placer	\$ 745,000
Gold, lodeozs.	244,378	5,051,293
Silverozs.	3,434,393	1,621,033
Leadlbs.	45,990,372	1,917,799
Copperlbs.	57,905,488	10,006,068
Zinclbs.	13,817,808	1,208,378
Total value		\$20,895,696

OTHER MINERALS. From time to time, in various parts of British Columbia, there have been discoveries of ores of the minor metals, and certain earthy minerals. These include mercury, molybdenum, platinum, tin, tungsten, asbestos, mica, salts, and, quite recently, magnesite.

The recent completion of the Grand Trunk Pacific, and the present construction of two lines which will connect it, virtually, with the C. P. R. main line, will serve to open, or reduce, the expense of operation in a great extent of country already known to contain many mineral prospects, some of which have been developed, and have begun to produce.

For some years past it has been a matter of extensive comment that the old type of prospector has had his day, and passed. As a class, he has nearly ceased to exist, and the reason appears to lie in the changed methods by which his discoveries become mines, or that the manner and scale of introduction of capital are different. If, therefore, the individual prospector becomes extinct, he must be replaced. His place will probably be taken, in large part at least, by syndicates, or companies, or, in other words, by capitalizing him, or incorporating him and his successors.

Mines, like humans, die. To continue the good they do, who better could become the prospector's successor than parties of young engineers under the guidance of their experienced elders, assured of some monetary recompense for their work, and spurred to their best efforts by a sense of co-ownership in whatever of prospective value may be found? They can be "found", and paid, from the funds of a corporation, prepared, if needs be, to lose some money, but, by persistent, and well directed energy they are far better equipped to win than the old prospector ever was.

Nature has evidently done her share towards the successful future of mining in British Columbia. When the demand for it is fully justified, transportation will be provided. Beyond the several discoveries already made in far distant places, then, the future must rest in the hands of the scientific prospector. Intelligent and sustained effort on his part will undoubtedly result in making British Columbia an even greater mining country, than that which has been accomplished in the last twenty-five years has proved it to be.

THE WESTERN LUMBER INDUSTRY

By J. HANBURY *

Owing to several conditions occurring during the past few years, I regret to record that the lumber industry has recently been in anything but a flourishing condition, though the evils existing can, and will, be remedied, we hope, in the very near future. A few years ago, western Canada experienced a period of rapid development, and the lumber industry was very prosperous. The building of the new transcontinental railways created a great demand for lumber, and the industry looked so inviting that we soon found ourselves in an era of overbuilding of sawmills. To make matters worse, many of these mills were managed by men who had little or no experience in the lumber business, which made conditions difficult for the practical lumbermen. Many concerns were taken over by brokers and promoters, who had no real interest in the welfare of the business. Companies were organized and over-capitalized, and the stock sold to an unsuspecting public, the mills concerned becoming so heavily burdened with interest charges that they could not be operated to produce profits. They thus became unfair competitors for the smaller individual manufacturer, trying to do business on a legitimate basis.

We have in British Columbia to-day enough mills to produce annually two billion feet of lumber, and the greatest demand ever required was about one billion. Hence, it can be seen readily that we have need for more intelligent cohesion among the manufacturers of our province. There is a field large enough for our wood products, and the facilities are here, but the quality and varied uses of our woods are

* John Hanbury: born, 1855; general contractor, Brandon, Manitoba, 1882; lumber merchant, operating a sash and door factory, 1886; added a sawmill business, 1899; operated sawmills in the Kootenay district, 1904-10; removed, in 1910, to Vancouver, B.C., where he built the first electrically equipped sawmill in Canada.

but little known to the outside world. It is time for the lumbermen to stop cutting each other's throats by useless competition—which, in the long run, does no good to themselves or those to whom they sell—and to organize their plants so as to operate on a fair business basis, that is, to sell their products for a little more than the cost of production.

The present condition of the trade is much more hopeful than it has been for three or four years past. The war has led to an increased demand for mill products, and we believe this demand will be greatly increased after the war. A large export market is open to us to-day, but we cannot get sufficient transportation. Inquiries are coming in from the United Kingdom regarding our facilities for providing portable houses for the re-housing of the population in northern France and Belgium, though there will be little of this business till the war is over and ample transportation available. We should be organized and advertised, so that we are ready when the markets open.

Government statistics tell us we have about four hundred billion feet of merchantable timber in British Columbia, and in addition to this, there are large areas of good timber in northern Alberta and northern Saskatchewan. In British Columbia every time a mill cuts one thousand feet of lumber the government collects an average royalty of seventy-five cents, so that the development of this, our greatest natural resource, is of immense value to the people. The lumber industry employs so much labour that its prosperity ensures the general prosperity of the province, as it keeps such large sums of money in circulation at home.

The splendid quality of our fir has only begun to be recognized. It is a semi-hardwood that lends itself to many purposes. When properly selected, it is a beautiful wood for interior finish, and a close competitor, at a much lower price, with oak and mahogany. People are just beginning to realize the possibilities of our western hemlock. It is destined to take the place of eastern pine for very many purposes; our pulp and paper mills have done great things with it already. This latter industry alone is producing three million dollars annually and it is only in its infancy. Box factories form another phase of the lumber industry, and for their product

there are great markets, both domestic and foreign. We have on the coast some splendid sash and door factories, and we feel satisfied that our fir doors can compete favourably with any doors in the world. For this product our market has been too limited, but improvement will follow now that the foreign markets are opening for us. The shingle business is no small factor in the lumber industry of this coast, a billion shingles having been marketed in one year by our local mills. The quality of our cedar is universally acknowledged as the best on this continent. We look for a lively period of immigration to follow the war, and the development of our western Canadian farm lands should greatly stimulate the lumber industry. With our three transcontinental railway lines, our overland transportation facilities are unsurpassed.

Owing to our lack of shipping facilities, our mills have been forced to bid on British Government orders through a San Francisco agency. In 1914 our local Provincial Government voted \$50,000 to assist in developing the foreign trade. Our Forestry Department is now working in conjunction with our Lumber Manufacturers' Association to organize a selling agency to take the entire charge of our export trade and apportion it among our various mills. The prosperity of the province is so dependent on this industry, that it seems a wise move for the government to co-operate with the manufacturers in an endeavour to improve the conditions of the trade.

We are now seeking from the Australian Government a preferential tariff on our lumber; and we feel that, in view of the splendid contributions made to the war by Canada, both of men and money, the British Government should, as far as possible, make all her purchases in Canada. Mr. McMillan, our chief forester and trade commissioner, has visited England to investigate the question of our foreign markets. Canada is such a huge country, and we have so small a population, and so little idle money, that we are not wealthy enough to "put up" such an extensive advertising campaign as is necessary for the success of our industry. The plants are here, perfectly equipped for the work; the raw material is varied and abundant. We need only an increased market

and export facilities, and the lumber industry will once more revive and prosper. I would like to see the Dominion and Provincial Governments assist this advertising campaign by placing in architects' offices, in all the principal cities of Europe, and the various British colonies, samples of the finished woods of British Columbia.

There seems to be an opening in Vancouver for a shipping concern owning boats for trans-Pacific trade, for even when the war ends, the revival of trade which is sure to follow will require much better transportation facilities than hitherto. The recent opening of the Panama Canal promises a great volume of business *via* the port of Vancouver, and opens to our British Columbia industry many new markets. Inquiries for our forest products are now arriving in increased numbers from the British West Indies, New Zealand, and Australia, as well as from the United Kingdom.

PACIFIC COAST FISHERIES

PRINCE RUPERT AND ITS FUTURE

BY F. W. WALLACE *

Prince Rupert, British Columbia, is situated upon the west side of Kaien Island, and in latitude 54 degrees 18 minutes north, and longitude 130 degrees 20 minutes west, or a little more than 300 miles due north of Vancouver. Eight years ago Prince Rupert was non-existent. It is now the Pacific terminus of the Grand Trunk Pacific Railway System, and was "made to order" by its engineers. It was carefully selected by the railway officials to be a great city, before the first tree was cut from the primeval growth that covered the site. Its location to the ports of the Orient, the mining areas and timber lands of northern and central British Columbia, the fishing grounds of the north Pacific, and the harvest fields of the new west, to be opened up by the railroad, were carefully considered, and the city was planned ere the first squatter had pitched camp. Dynamite, the steam shovel, and the woodman's axe soon cleared, and levelled the site, and before the first transcontinental train pulled into the place, Prince Rupert was a city with water, light, heat, power, and sewage systems installed; banks, telephones, wharves, freight yards, and warehouses were completed and ready to facilitate the commerce which followed the connecting steel.

Two great cities of the Old World—Amsterdam and Copenhagen—were formerly fishing villages, and both were said to be "built on herring-bones". The twentieth century city of the New World, Prince Rupert, can claim a similar excuse

* Frederick William Wallace: born 1886; has worked as a practical fisherman on Atlantic ocean banks, Great Lakes, and the halibut banks of Alaska. Sec'y.-Treas., Canadian Fisheries Ass'n.; vice-commodore, Hudson Yacht Club; editor, "Canadian Fisherman"; author of "Blue Water: A Tale of the Deep Sea Fishermen", and other seafaring and fishing works.

for existence. The halibut and the railway have practically made the place.

The common halibut (*hippoglossus vulgaris*) abounds in huge quantities in the waters of the north Pacific, and particularly so in the seas adjacent to, and north of, Prince Rupert. The halibut "banks" extend from off the Coquille River, Oregon, northward to the Bering Sea, but the best fishing grounds are from Hecate Straits to the Shumagin Islands, Alaska, and Prince Rupert is the radial centre of this vast area. According to Dr. Bean, the halibut are in greatest abundance in the Gulf of Alaska, particularly about Kodiak and Shumagin Islands.

Dixon Entrance, off Prince Rupert harbour, Hecate Straits, and Queen Charlotte Islands, a few miles out from the city, are famous halibut grounds, and a large fleet of fishing craft from Seattle, Vancouver, and Prince Rupert operate there. Out of Prince Rupert, during 1915, a fleet of about fifty vessels, with crews ranging from four to twenty men, were engaged in the halibut fishery. In addition to these, American fishermen, who, by virtue of a recent Order-in-Council, are entitled to sell their fish in bond at British Columbia ports, run their fares to Prince Rupert and sell, or ship, to United States markets, rather than make the long trip back to Seattle. During the month of September, 1915, the home fleet and the American vessels availing themselves of this privilege, landed no less than 2,165,500 pounds of halibut at Prince Rupert. During the same period sixty-two carloads of fresh fish, practically all halibut, were shipped to eastern Canadian and United States markets over the Grand Trunk Pacific. A certain amount was also shipped south by steamer, in addition to about eight carloads of broken shipments sent over the railroad.

Present facilities for taking care of the fisheries at Prince Rupert consist of a modern cold storage plant and wharf capable of storing 7,000 tons of halibut, and other fish, in refrigerator chambers. The plant is a six-storey steel and concrete building, located on Seal Cove, a mile north of the city. The Grand Trunk Pacific has tracks running into the premises, and from seven to eight full carloads can be loaded and shipped daily. In addition, three Canadian and several

Seattle fishing concerns have buying agencies there, and fish are landed and shipped fresh at the city wharves.

The Skeena and Naas Rivers, a few miles south and north of Prince Rupert, are famous salmon grounds, and the numerous inlets and fjords of the broken and indented coast in the locality are prolific salmon fishing areas. Across the harbour from Prince Rupert, the Canadian Fish and Cold Storage Co., Ltd., has a cannery, capable of packing 40,000 cases of salmon during the season. There are some twenty canneries and six cold storage plants, located on the Skeena, the Naas; and in the vicinity, but apart from the packing industry, a great quantity of fresh and frozen salmon is shipped to market out of the port. During September, 1915, 1,799,200 pounds of fresh salmon were landed in Prince Rupert—some of which was canned, and a large quantity shipped fresh and cured to eastern markets.

Herring swarm in enormous quantities into the inlets of the serrated coast in the vicinity of Prince Rupert, and in the harbour of the city they have been dipped up by scowloads. The herring of the Pacific differs but little from the herring of the Atlantic—it runs a trifle smaller in size, perhaps—but the schools are of almost incredible size and numbers. At the present time, herring fishing is not engaged in to any extent as a food fish—those caught being used for bait in the halibut fishery. A few barrels are cured and shipped to eastern markets, and a small quantity are smoked and kippered.

The waters of the north Pacific abound in black and gray cod, but the fishery is not specially engaged in. The codfish brought into Prince Rupert are caught by the halibut fishermen upon their halibut gear, and generally amount to a few thousand pounds hooked during the last "set," and brought to port to supply what little demand there may be for them. Black cod is put up in a smoked form at Prince Rupert, but though the fish are extremely plentiful, there is, at present, no market of sufficient importance to warrant an exclusive fishery.

Without discussing Prince Rupert's future as an ocean port, its possibilities as a great fishing centre are sure. It is endowed with all the means to make it such, and its de-

velopment depends upon the expansion of the market for fish, not only in Canada, but in the United States, the Orient, and Europe. The great European war will result in changed economic conditions, and it is in foodstuffs that the change will be felt most. The cattle ranches and grazing grounds are more valuable as agricultural lands for the growing of grain and other products, and the future will bring a system of intensive farming, which, to some extent, discourages cattle-raising. As a consequence, fish must necessarily, in a measure, take the place of meat—beef, at first, and latterly mutton and pork. As time goes on, the first two will increase in price, owing to the land space required in raising them, and fish will doubtless take their places as a means of sustenance.

The great American fishing fleets are gradually cleaning up the halibut grounds of the inshore areas south of the Queen Charlotte Islands, and, as a consequence, have to go further afield for their fares. The best halibut grounds at present are in Hecate Straits, and in the Gulf of Alaska. Prince Rupert is the nearest port, with rail connections to the markets of the eastern cities, and by virtue of its location, is nearly 500 miles nearer the Alaskan halibut grounds than is the nearest American port, Seattle. As the fishing fleets shift northward, Prince Rupert will become the shipping port for the eastern American and Canadian markets. It is only logical to presume that the American fish dealers will prefer to ship their fish from Prince Rupert, rather than have their vessels running 1,000 miles to and from the grounds for the purpose of shipping direct from Seattle. This forecast is visible already, as from September 17th to October 15th, 1915, no fewer than fifty-one American vessels landed halibut fares at Prince Rupert, aggregating over 1,000,000 pounds, valued at, approximately, \$50,000.

To cater for this growing business, the citizens of Prince Rupert purpose to construct a municipal fish wharf and cold storage, where independent American fishermen can discharge and sell their catches to competitive buyers. Supply houses dealing in fishing gear have already opened branches in Prince Rupert, and the Imperial Oil Company has installed several oil tanks for supplying fuel to the fishing fleet.

The salmon fisheries of northern British Columbia are already well established, and were operated by Vancouver firms long before Prince Rupert sprang into existence. The bulk of the canned salmon goes down by boat to Vancouver, but a certain amount goes through Prince Rupert, and over the Grand Trunk Pacific, to the eastern market. It is not an unlikely supposition that in future a large proportion of the northern British Columbia salmon pack will be distributed through Prince Rupert. In the shipping of fresh and frozen salmon, and the manufacture of smoked, mild cured, and pickled salmon of all varieties—sockeye, spring, coho, humpback, and dog—Prince Rupert will probably handle all the northern catch. The coarser varieties of salmon of the northern waters will have an undoubted market in the future, and Prince Rupert will take care of all the catch of the vicinity put up in a salted, smoked, or similarly prepared state.

While the long-established halibut and salmon fisheries will benefit this centre in their future development, it will be more in the undeveloped fisheries of the northern waters that Prince Rupert will win a commanding position. The foremost of these will be the cod-fishery of south-western Alaska and the Bering Sea.

At the present time the Pacific cod-fishery is practically undeveloped for lack of a market. True, there is a fleet of cod-fishing vessels operated out of Anacortes, Washington, and San Francisco, California, fishing the Bering Sea banks, but little attention is paid to the cod by the Canadian fleets. The Pacific codfish differs but little from its Atlantic brother, yet the Canadian Atlantic codfish catch amounted to over three million dollars in value, while that of the Pacific amounted to less than one-twelfth of that sum. The codfish of Alaska and the Bering Sea are splendid cold-water fish, and are exceedingly prolific. With the world's increased consumption of fish food in the future, there is not the least doubt but that the Pacific codfish will be able to find a market. Prince Rupert, the nearest rail port to the cod-fishing banks of the Bering Sea, will become the centre of this future industry just as Gloucester has upon the Atlantic, and though the climate is not ideal for drying cod, yet

modern methods of steam and air drying will prove adequate.

The unestimated wealth of herring, which yearly swarm in the waters around Prince Rupert, affords a future industry of great magnitude. The Oriental market offers great possibilities in the future for salted and pickled herring. It is a cheap food, and will appeal to the Orientals, and the same herring, if cured in the Scottish style, and properly packed, will find a market in the east. The curing and packing of this easily procurable fish and the smoking, and kippering, are branches of Prince Rupert's fisheries which are destined to become great.

The fishery wealth of the north Pacific lies "north of fifty-three". Salmon, halibut, codfish, arrow-toothed halibut, herring, red rockfish, and skate abound in countless millions, yet of all these edible fish, the salmon and the halibut alone are commercially exploited. Prince Rupert, the most northerly transcontinental railroad port of North America, has this fishery wealth at her very door, and with the development of markets, which is bound to come, is destined to be one of the great fishing centres of the world.

SUB-ARCTIC CANADA

WHAT THE YUKON OFFERS

BY ALFRED THOMPSON, M.D., M.P.*

The Yukon Territory is the last piece of the last west, as far as Canada is concerned. This great territory marks the western boundary of Canada, where it joins Alaska. The boundary-line between the District of Alaska and the Territory of the Yukon is the 141st meridian west, running from Mt. St. Elias to the Arctic ocean, and in length is about 600 miles. This line is extended for 500 miles further, following the sinuosities of the coast south to the Portland Canal.

In speaking of the hundred years of peace between the Stars and Stripes and the Union Jack, and the unfortified boundary crossing the continent, it is often overlooked that the territory of the two countries lies side by side for 1,000 miles in the north; that both countries have settlements on each side of the boundary line, and on the littoral of the Arctic Sea.

The area of the Yukon Territory is, roughly, 200,000 square miles. It is drained by the Yukon River, which gives the territory its name.

The Yukon River has its source in the mountains of the Coast Range, and flows through the Yukon plateau, in a westerly direction, emptying its waters into the Bering Sea. Like the St. Lawrence, its flow is controlled by great lakes, the basins of which collect the waters, and thereby prevent floods, such as frequently occur, for instance, on the Mississippi River. These lakes are on the upper reaches of this stream, and will be an important factor in the development of the territory, as they are now an important factor in assist-

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ing in navigation on the Yukon, by furnishing a large flow of water in the latter half of the summer, when it is most needed. This river is navigable without a break for about 2,000 miles, from the Bering Sea to the White Horse rapids.

The rivers tributary to the Yukon, such as the Stewart, the Pelly, the White, and others, have shorter valleys, and high-water in those streams comes in the early months of the summer, thus equalizing in a measure, the flow of the Yukon River generally. While the smaller streams furnish most of the water in the early months, the lake basins fill up with the melting snows and overflow in the middle of the summer, thereby furnishing ample water for navigation until late in the fall. There are several tributaries of the Yukon which are also navigable for from 200 to 300 miles each.

Taken as a whole, the Yukon has a salubrious climate. The winters extend to about seven months of the year. The cold is not intense, except at certain periods in the mid-winter months, when, at times, the temperature drops very low. As a rule, the cold spells do not last long, and between these periods the weather is very fine. Very few storms occur, the rainfall is light, and there is practically no wind. The snowfall is also light. Two feet would be perhaps about the average, and this represents all the snow that falls throughout the winter. Winter thaws are rare. Spring comes early. The first wild flowers appear in the last week of April. As is true in most countries of the far north, the transition from winter to summer is so rapid, that it may be said there is practically no spring at all.

The Yukon summer is a paradise, with long, sunshiny days, and from the middle of May until the middle of July there is no night. The sun goes below the horizon on the longest day for about four hours, but at midnight on the 21st June there is as much light as immediately after sunset.

May, June, July, and the first half of August are summer months. From the middle of August to the first of October is fall weather, and by the middle of October the ice is forming on the rivers, and winter begins.

Visitors to the Yukon are surprised to find that the flora of the territory is not of the Arctic variety; in the main it is the same as that found in eastern and western Canada.

The country abounds with a great variety of beautiful wild flowers, and wild berries, similar to those found in eastern Canada, such as blueberries, raspberries, cranberries, and a number of varieties that are peculiar to the territory itself. Cultivated flowers do particularly well there, especially pansies and sweet peas.

The agricultural possibilities in the territory have not, by any means, been developed to the extent they will be in the future. Oats, barley, potatoes, turnips, peas, cabbages, cauliflower, and celery grow there very well. The celery and cauliflower are particularly fine. On account of the long hours of sunlight in the growing period in the Yukon, vegetable growth is very rapid, and as a result there is a minimum of fibre and a maximum of pulp. Wheat has also ripened in the southern Yukon.

Dr. Dawson, who visited the territory in 1887 and 1888, and after whom the city of Dawson is named, mentions in his report that the general conditions in the Yukon are reproduced in some of the inland provinces of Russia, particularly the Province of Vologda, in European Russia, which offers the nearest parallel. He says, "The climate in both countries is a continental one, in which severe winters alternate with warm summers, and the actual degrees of cold and heat, so far as our information goes, are not dissimilar. There is no very heavy rainfall in either region, such as we find near the western coast boundaries on the Atlantic, and on the Pacific, respectively. The agricultural products from the Province of Vologda are oats, rye, barley, hemp, flax, and pulse. Horses and cattle are reared, and skins of the various wild animals, as well as peat and turpentine, are among the exports. The population of Vologda is well over a million people."

It is now known that there are several thousand square miles of good agricultural land in the Yukon, which will, in the fullness of time, be brought under cultivation. At the experimental stations of the United States Government, in Alaska, the cultivation of a Siberian alfalfa is being successfully carried on. Conditions are similar in the Yukon valley, and if this plant can be grown in Alaska, it can be grown as well in the Yukon. This will go a long way towards solving

the fodder problem, and with the cultivation of grain, will make it possible to winter stock.

There are thousands of square miles in the territory suitable for grazing purposes. The chief hay grasses of the North-West Territories grow luxuriantly, and are indigenous in the Yukon. We find there the red-top grasses, bunch grasses, and blue grasses growing in great profusion. The calamagrostis grasses are widely distributed. Pea vine is found in many places along the river bottoms. The presence of these nutritious grasses insures an ample supply of pasturage, and even without the Siberian alfalfa, it is believed, the grasses at present growing in the territory would, if harvested, provide fodder in the winter months for large herds of cattle and horses.

Horses live out all winter in south-western Yukon, and have done so for several years past. Whether cattle could do so remains to be proven; but it is thought they can, as the grasses grow long, and there is a light snowfall, with rarely any crust on the snow. Those most competent to judge, believe that the Yukon has a promising future as a grazing country.

Up to the present time the wealth developed in the Yukon has been chiefly from its mines, and of all the precious metals, gold is the chief product.

Gold was discovered in the Klondike in 1896, and since that time between \$175,000,000 and \$200,000,000 in placer gold has been won. It is now producing about \$5,000,000 per year. From present indications, it looks as if this output would continue for several years to come, and, further, there is always the possibility that a new strike may be made.

The auriferous gravels cover a large area, and are found in the valleys of nearly all the streams tributary to the Yukon River. The lowest grade gravels await only better transportation facilities to bring them within the producing area. Enough is already known about the presence and value of these gold-bearing gravels to say that it is more than probable that the Yukon Territory will produce more gold in the future than it has in the past. Gold-bearing quartz has been found in different parts of the territory, and platinum is found in small quantities along nearly all the tributaries of the Yukon River, in association with gold.

Of the 200,000 square miles in the territory, only 32 per cent. has been explored. The remaining 68 per cent. has not even been explored as to its geological features. Of the 32 per cent. explored, about 17 per cent. has been prospected, and of the 17 per cent. prospected, only from 4 to 6 per cent. has been developed.

Besides gold, there are large deposits of copper-ore in the vicinity of White Horse, in southern Yukon, and outcrops of copper also appear in the Kluane Lake district. Extensive deposits of this metal are known to exist in the upper White River district, in the vicinity of the boundary line. There are, no doubt, other deposits between White River and White Horse. A promising silver-lead camp is developing in the upper Stewart River district. The metalliferous ores seem to be well distributed throughout the territory.

There are at present five billion tons of coal in sight in the Yukon Territory, and these deposits have been found within the 17 per cent. which has been explored. These exploratory surveys have occurred mostly along the water-courses. What the unexplored country, between the water-courses, contains in coal measures or minerals is a mere matter of speculation. A new coal-field was discovered in the year 1914.

The country is fairly well wooded, and enough timber can be secured for ordinary purposes for some time to come. In the valleys and on the lowlands there is an abundance of white spruce of fair to good quality, well suited for purposes of construction.

Moose inhabit the whole territory, and are very large in size. Caribou roam in huge herds and live on a succulent moss, which is found on the ranges of hills lying between the streams. Black and grizzly bears roam over the entire region. Cross, black, and silver fox, mountain sheep, and wolves are found. Beavers are found along nearly all the streams. Of the smaller fur-bearing animals, the marten, mink, lynx, and muskrat are perhaps the most important from an economic standpoint. The fur trade has always been an important economic factor in the Yukon, and will be for many years to come. It is difficult to obtain an accurate estimate of the amount of fur shipped per annum, but it is an item of very considerable importance in the territory.

Salmon are found in the Yukon River and its tributaries. Throughout the country, the lakes and rivers, generally, are well supplied with fish, of which white fish, lake trout, grayling, and pike may be mentioned.

The White Pass and Yukon Railway connects tidewater at Skagway, Alaska, with Whitehorse, at the head of navigation, on the Yukon River. From Whitehorse splendid boats ply upon the Yukon for 2,000 miles, to its confluence with the Bering Sea. Similar boats also navigate the rivers tributary to the Yukon. There is another route through which a railroad could be built into the heart of the territory. From tidewater, on the Lynn Canal, this would follow Klukwan River through the strip of American territory, and cross the Coast Range by means of a low pass, which would carry the road into the Yukon plateau. Either of the lines projected along the valley of the Yukon River would supply the interior of the territory and Alaska with a trunk line, and are the natural routes to connect the interior of these vast regions with the sea.

The valleys of northern British Columbia and western Alberta also furnish routes, by means of which easy access could be had to the Yukon to connect up with the transcontinental systems of Canada. As soon as sufficient development occurs along either of these routes, capital will be secured to furnish transportation. There are no insuperable difficulties in railroading in the Yukon, either in building or operating lines.

There is excellent water-power at Whitehorse rapids, in the southern Yukon. This will be developed eventually, and will furnish power for those copper and silver mines which are awaiting improved conditions to help them to produce good profits. Hydro-electric power plants are already transforming the energies of the Klondike and Twelve Mile Rivers into power. This is now being used to drive the dredges that are digging the gold in the Klondike district. Other water-powers are found on the Stewart River, which will be developed as the market in that district warrants. Like the distribution of its mineral wealth, the water-powers of the Yukon are well placed for the future development of the material resources of the territory.

The territory abounds in matters of interest for the scientist. Its glaciation is a question requiring further study. Among the detritus of the glacial period, the remains of the mastodon and mammoth are frequently found. A volcanic ash deposit covers a large area. The origin of this deposit is still a matter of question. The rocks are the same as are found in the Cordillera belt, in northern British Columbia. The geological survey is being gradually pushed forward year by year, until eventually it will cover the whole territory.

From the imperfect survey of the natural resources of the Yukon here given, it will be readily granted that this great territory has not by any means reached the last page of its history.

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* No attempt has been made to supply a copious index—which might savour of redundancy—but effort has been made to keep it as short and concise as possible by including only the more important references.—Ed.

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